The Builder.

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Something of what has been done in 1867.

ALTOGETHER, the year that has but a few more days to run has been a busy one. It would almost seem that as the world gets older it is beginning to make better use of its time. There appears to be a wider-spread, more serious, more hearty determination to improve the condition of things generally. Acceleration of pace in all things is the tendency of the day. The great human family is getting so large, requires so much food, so much clothing, so much housing, that the time for taking things quietly has gone by, and incessant activity, or co-operation in some form, is required on all sides. Instead of a thousand years being as a day, a day must be as a thousand years with us. Let us look back upon some of the year's work. Altogether, as we have said, it has been a busy year. Satisfactory, fruitful, initiatory work has been done in it. We sent out representatives to the Great Exposition, Paris; to the Congress at Antwerp; to the Sanitary Conference at Weimar; we had great gatherings of our own at Belfast and Dundee, for the consideration of social and scientific matters; we received the Belgian volunteers, the Sultan, and the Pacha of Egypt; the old-accustomed Eisteddfod was held at Carmarthen; divers architectural and archæological societies moved hither and thither, in prosecution of their studies; various minute investigations into causes that affect the public health have been made by Government officers; we have had some trial of the working of the new Sanitary Act; several towns that have hitherto held out against the adoption of constructional sanitary works have complied with this great necessity; we have had a second essay of a Natural Portrait Exhibition; and several important public buildings have been designed, while progress has been made with those in hand.

It has been a year of especial attention to workhouses and their infirmaries, not bestowed, as we have often urged, before it was cryingly needed. The Clerkenwell guardians of the poor determined to erect a supplementary establishment at Holloway; those of St. Martin's-in-the-Fields commenced to carry out their intention to build a similar retreat for 400 old men and women at Wimbledon, at a cost of 25,000*l.*; and those of Marylebone have built new casual wards. St. Pancras, too, has taken steps towards building an infirmary at Highgate. The Bangor and Beaumaris Union resolved on a new hospital; handsome prizes were offered for designs for a new workhouse at Penkridge; Hertford set about accomplishing a new workhouse and infirmary; Burnley Union resolves upon a new workhouse; men have been employed the live-long year over a new workhouse at Morpeth; Durham has stirred itself to enlarge and improve its workhouse accommodation; Newport Union has bethought itself of an infirmary; Darlington has issued an offer of prizes for designs for a new workhouse, having previously offered a small sum for designs for the extension of present premises; among other cases, the guardians of Gravesend and Milton are also putting their poorhouse in order. Lewes Union is far advanced in a project for a new workhouse; the Bristol guardians are busy over a new hospital for their union-house; Brentford is busy building additional casual wards, as is the City of London Union; Birkenhead intends new schools for High Tranmere workhouse; Whitechapel Union has building works on hand.

It has been a year, too, of some private munificence for public objects. The Mayer Museum, rich in Mediæval works in gold and silver, gems, Anglo-Saxon antiquities, and illustrations of Wedgwood, has been presented to Liverpool. The Marquis of Westminster has presented a park to Chester; and Preston in also indebted to a liberal giver,—the late Alderman Miller,—for one of its three new public parks. At Stockwell, Mrs. Hillyard laid the foundation-stones of three homes for fatherless boys, towards the cost of which she contributed the sum of 20,000*l.* A museum has been given to Salisbury, by Mr. William Blackmore. Admiral Kelly bequeathed 80,000*l.* for the establishment of a college in Devonshire. Baron Ferdinand de Rothschild has taken the preliminary step of purchase of a site for a new hospital in Southwark Bridge-road. The Earl of Dudley has given a fountain to Dudley. Mr. M. T. Bass presented a recreation-ground to Derby. Mr. Alfred Harris gave 3,800*l.* for the foundation of a fever hospital at Bradford; and many open hands have given round sums of 1,000*l.* each for various building purposes of a charitable basis.

The borough of Liverpool wisely laid out 200*l.* in stimulating the thoughts of trained minds towards the production of good dwellings for the labouring classes; though how it may result is not yet certain. On the other hand, at Wigan, fifty cottages were put up for competition—plans and tenders indiscriminately—without any attempt to make good use of an opportunity seldom occurring. Labourers' dwellings, we perceive, are now incorporated, very properly, as one of the features of flower-shows. What could be a prettier object in a nobleman's garden than a model cottage for his head gardener, or a dozen model cottages for his dozen labourers? We suggest, here, by the way, that designs for lodges, drinking-fountains, garden-seats, and so on, should occasionally vary the list of objects. The project of growing fruit upon glass walls might be tested by offers of premiums, and sums might be apportioned for the trial of experiments likely to result in any increase in the production of fruit or vegetables, such as the *cordon* system. These institutions might be made more useful than they are.

There have been several important competitions in the course of the year. The public interest in the competition designs for the National Gallery extended into the early part of the spring; the competition for the New Law Courts, in London, belongs exclusively to it. We have also had competitions for the London Orphan Asylum; for Manchester Town-hall; for the Middle-class School, Bedfordshire; and there have been others for the laying out of several estates,—Sefton Park among them. The protection of the headland at Hartlepool has been thrown open to the profession; the ferry landing-stages and steps of the Wallasey and Liverpool ferries have also been submitted to competition; and suggestions and plans for the disposal and removal of snow have been sought by the offer of premiums. Among the miscellaneous works for which competitive designs were invited were the parish church of Ryde; the Corn Exchange, Luton; the Plait-hall, Luton; the Town-hall, Grantham; Dorchester Church; new offices for the Board of Works, Poplar; offices and vestry, West Ham; the clock tower, Leicester; the Orphan Asylum, Worcester; the cemetery chapels and lodge, Biggleswade; the Memorial of the Countess of Ellesmere; the new chapel for the County Asylum, Derby; and some other churches and chapels. Besides these a very large number of new works have been executed from designs that were not selected from public competition. Thus, we note Coventry is to have two more churches, albeit, it has already "three tall spires; Taunton is to have a college school; Armley, Leeds, is compassing a new church, as are Cassop-cum-Quarrington and Coxhoe, near Durham; Marsden, near Huddersfield; Worksop, near Nottingham; New England, near Peterborough; and Ramsden, near Basingstoke, among other places. Rochester is to have a cattle market. Schools, too, have been building in quiet little villages and busy manufacturing towns,—at Barfreston, in Kent, famous for its delightful little Norman church, and bustling Birmingham, to wit. Doncaster, Wouldham in Kent, can also boast progress in new schools. And the work of restoration of ancient churches has by no means been standing still. With regard to the character, management, and results of some of the competitions of the passing year, there has been the usual amount of dissatisfaction. Those that are thrown open to the profession with the promise that professional advice will be sought to assist in the selection of the prize designs; those which are limited to a certain number of architects, with the understanding that the author of the selected design shall carry it out; those in which equal sums are offered to a limited number of competitors from whose designs one will be selected for execution,—all give a certain amount of vexation; but those thrown open to the architectural public with no promise or intention of taking any professional advice in the selection of the premiated designs give still more. With the first-mentioned class there is, however, but little real cause of complaint. Provided that it is a national work, perhaps there is not a better plan than to permit any one to enter the lists who chooses to do so. It is open to all to measure their own strength, and refrain from competing, if it be not of an order that justifies the so doing. The certainty of fairness and acumen in the selection divests competitors of any grievance. Those who do not win may be assured that those who have done so have either complied more strictly with the instructions or are more skilful in their art. The second class is not so satisfactory as the third. An invitation to a limited competition is a special call upon an architect to leave his ninety-and-nine sheep to look after this one. It appears therefore only reasonable that a fixed sum should be offered to such competitor as some recompense for the trouble that must be the cause of neglect to other work. These classes have only the disadvantage that an outsider, be he ever so talented or acquainted with the description of building with which the competition deals, has no chance of affording what might be a really better design than the chosen competitors could furnish. It is, however, on the score of the third class that we continue to receive note after note, chorus after chorus, of dissatisfaction. The tenor of most of the communications addressed to us on this score runs in this way:—Nothing can be too bad to say of it. To comply with its terms is to be deluded and disappointed. When there is no professional advice sought, there is no accurate knowledge of the question present at the councils that are to judge it, and it becomes little more than a mere matter of personal favour who is to have the premiums. This is, of course, most strikingly the case in the matter of country competitions. Is it a Tappington Butts competition? Then a Tappington Butts man will get the prize. If there be more than one architect in Tappington Butts, then he who has the

largest number of friends in the body offering the premium will get it. Are there more prizes than one? Then the "local man," as he is familiarly called, will get the best of them. And so on through every phase of the question. Sometimes, moreover, justly; the local man knowing best what is wanted.

There has been but little said of late about baths and washhouses, but that little has been eminently satisfactory. St. Pancras has laid out some 10,000*l.* on a new building, with every appliance of the most modern description. This establishment will be opened in a week or two, and promises great advantages to that extensive parish. The Marylebone baths and washhouses have not only paid their own expenses, but yield an income of a thousand pounds per annum to the parish. Here is a profitable field for philanthropic speculators, not to say for those who have an eye for profit solely.

The places that have set themselves to the task of re-arrangement upon a sanitary basis, as far as constructional works are concerned, are Winchester, Kidderminster, Little Hampton, Chatham, Much Wooten, Leytonstone, and Bedford. Waterworks have also been executed in several places. The startling facts ascertained in the course of the Governmental inquiry into the effects upon the public health of efficient sewerage and water supplies, will, doubtless, cause a great acceleration to these movements for the next few years. Now, that it is shown that cholera, consumption, diarrhœa, measles, small-pox, and typhus fever, are disarmed by these measures, and rendered much less dangerous invaders of our homes, we may expect a general movement in their favour. Few bodies of men will care to incur the responsibility of refusal to take steps so important for the well-being of the communities they represent.

In the metropolis the progress that has been made consists more in the continuation and accomplishment of works commenced in former years than in new undertakings. The new *quartier* rising on the site of dingy Pimlico; the increased height of the pyramidal webwork of scaffolding encrusting the national memorial of Albert the Good; the open lengths of the Thames Embankment on the north side of the river, and the irruption of men, horses, carts, machinery, and all sorts of building materials and contrivances on the south side; the continuation of underground and above-ground metropolitan railways; the suburban extension of the great Babylon east and west, north and south, are all instances in point. We seem to have taken no leaps either in the dark or otherwise, but to have pressed stoutly, steadily, confidently forward. Among items that are, however, new, are three that carry us back to very old times, and set us thinking of a land flowing with milk and honey, of forests of cedars and almug-trees, and camel-trains laden with gold and precious stones. These are new synagogues. One has been built in the Walworth-road; another for 700 German Jews in New Broad-street, City; and a competition for a third at the corner of Upper Berkeley-street, Edgware-road, has been decided, and some preliminary steps taken towards its accomplishment. It is to be regretted that this last will yield nothing towards the beautifying of our street architecture. It will be quite out of sight behind the line of houses, where no Queen of Sheba could possibly observe it.

This is but a faint outline of some of the work done in one particular department in 1867. Everybody has a little world of his own full of details, from which he can fill up the picture for himself. One man's path leads to the right and another to the left, and each sees different objects; they are, however, but part of the whole. The general view is fairly satisfactory; and gives us fresh courage with which to greet the new year. Continental progress is so swift, and competition so keen, it behoves every one to put his best foot forwards. An enormous work is before us, and of this we will talk in good time.

New Museum in Prussia.—The museum at Sigmaringen, founded by Prince Charles-Antoine, has been inaugurated in presence of the King and Queen of Prussia. It includes pictures by German masters of the fifteenth and sixteenth centuries, and objects of art of all kinds. The *Revue Artistique* says it is an imitation of the Musée de Cluny, and is a proof that the travels of foreign princes in France are not altogether useless in the progress of civilization.

PHYSICAL ENGINEERING, FROM CHEOPS TO SAID PACHA.

The *Novum Organum* commences with a reference to the position of man as "the minister and interpreter of Nature." That ministry has had a wonderful expansion since, and in no slight degree in consequence of, the labours of Bacon; but amid all the advance of the past century there are two occupations which may claim, in a special manner, to be those of the assistant of nature. They are those of the physician and of the engineer.

In the case of the physician, it is best known to those who have had the most frequent need to consult the most eminent members of the profession how much, how almost entirely, they depend on the *vis medicatrix naturæ*. Certain known specifics are afforded by the pharmacopœia; certain disorders have their crises and their courses, which experience, aided by the knowledge of the individual constitution, may with much accuracy predict. Beyond this, it is chiefly the youngest and most sanguine members of the profession who are most confident in the efficacy of prescriptions, while the number of ingredients which still at times go to make up a single medicament is in itself a proof how far the man of art is feeling in the dark after, if not the nature of the disease, at least the mode of cure.

Side by side with those regular practitioners, who, while they more or less tacitly confess the empirical and conjectural state of the art, in spite of the constant illumination sought from dissection, and the instructive whispers of the stethoscope, is a smaller, more confident fraternity, who believe that they have laid at least the foundations of a real science of therapeutics. Accused of treating symptoms only, they reply that each symptom is the mute appeal of nature for a specific remedy, and that the law of healing is *similia similibus curantur*. A rigid regimen, and a belief, founded they say on experience, in the effective power of infinitesimal doses of pure, carefully-prepared, medicaments, form the chief features of this new heresy, which, at the present moment, seems often to be held to by those, when in tolerable health, who in graver cases fly to the established mode of treatment.

But however marked may be the advance of the knowledge of the veins and arteries, the nerves, muscles, and sinews, and the whole vital mechanism of the human frame, between the time when Homer gave such accurate descriptions of wounds and the date of the practice of Nelaton and of Paget; or that of the acquaintance possessed with the secrets of organic chemistry, if we compare the knowledge of Bichat with that of "Pæon, physician of the gods," the bumbler student of mechanics has distanced his elder brother. Brunel is more a-head of Dædalus than Jenner is in advance of Esculapius. Nature seems to have yielded not only her secrets but her powers to the modern mechanic, and the traject of a train weighing a hundred tons, propelled with the steadiness of a mule, but at the speed of a swallow, would have appeared to the builders of the Pyramids to hold to the supernatural. The chief energy of the inventive mechanic has been turned, for the last five or ten years, chiefly to the improvement of machinery for the destruction of human life; but at the same time how much has been done in the improvement of machine tools, that department of practical mechanics which endows engines that consume coal and vomit steam almost with the vitality of reproductive species.

While mechanical engineering, notwithstanding the present excellence of much that it produces, may be considered as only at the commencement of its brilliant triumph over brute and menial labour, that other branch of the science of the engineer which more directly consists in the imitation of nature, and in the control and adaptation to human service of her great wasted forces, may be thought to have erected nobler monuments in the past than in the present era. The field of the labour of the engineer has, indeed, been widely extended by the demands of modern civilization. The masonry and earthworks which during the last thirty-three years have, in our own country alone, been constructed for railway substructure, would, if they could be brought within the compass of a bird's-eye-view, appear of formidable magnitude. If we look at the railways of the Continent a similar remark is applicable. Nor are railways the only work of the past century,—canals, roads, harbours, docks, all attest the care and the skill of the engineer, although any single work or system of works of our time sinks into insignificance when compared with the mighty labours effected at the bidding of some of the ancient kings of Egypt. Egypt is the home of engineering. There the forces of nature, displayed in a mode which, so far as our geographical knowledge extends, is unique, produce effects of portentous and unrivalled magnitude. There, in past times, have been executed the most stupendous works ever designed by man; and there, at this present moment, is being carried out an engineering work which may justly rank among the wonders of the world.

Since we called the attention of our readers to the line of route to India, and to that great and little-understood undertaking which was designed as the counterpart to the piercing of the Alps, further information has reached this country as to the state of the Suez Canal, and as to the work yet remaining to be executed in order to the completion of that singular enterprise. Not only does this information confirm, in every particular, the truth of the views we ventured to express, but the mind of the reporter seems to have been impressed with a conviction very similar to that under which we wrote. The works in progress, we are told, are stupendous, but the enterprise is not one which would have been entered on by men of business. A brief summary of what is actually going on cannot fail to interest our readers.

Entering from the Mediterranean under the protection of a long sea-wall or jetty, which threatens to be a source of no slight trouble from the constant displacement and accumulation of sand, the Suez Canal, after passing through the narrow strip of land on which Port Said is situated, runs for some twenty miles through the large shallow lagoon or salt-water lake, named Lake Menzaleh, into which the sea enters freely by several inlets, and the depth of which varies from 1 ft. to 10 ft. Eleven miles of solid cutting succeed, through ground from 15 ft. to 30 ft. above the sea level. A second small lake, —Lake Ballah,—is then crossed, and a further distance of eleven miles intervening between this point and the third lake,—Timsah,—contains cuttings of from 30 ft. to 85 ft. in depth. A distance of three miles across Lake Timsah brings us to a third heavy cutting of eight miles in length, varying from 30 ft. to 62 ft. in depth. The canal then passes through the Bitter Lakes, where only from 6 ft. to 9 ft. dredging is estimated as necessary; and the last cutting, which leads to Suez, is for a distance of 12½ miles, of from 30 ft. to 56 ft. in depth. Thus, out of a total length of 90 miles, 42½ miles are through cuttings of from 41 ft. to 85 ft., the section of the canal itself being 26 ft. in depth, while the width at the surface-level, rendered necessary by the loose character of the soil, and by the abandonment of the original design of pitching or walling the sides, is of the enormous dimension of 112 yards. In forming even the roughest estimate of the prodigious bulk of excavation requisite for the completion of this scheme, it is necessary to bear in mind the great difference in the labour necessary for merely shovelling away loose sand and in that for executing earthwork such as occurs in our own experience. But in the heaviest cuttings this advantage vanishes. In the eleven-mile excavation between lakes Ballah and Timsah occur both clayey and agglomerated sands. The general slope of the cutting is one and a half to one, giving a width at top in some places of 519 ft., the deepest point being 87 ft., near which, for a quarter of a mile in length, the sand is cut perpendicularly for 30 ft. in height. It is evident, therefore, that in the heaviest portions of the work excavation means excavation. About a third of this prodigious quantity of earthwork is now executed.

Any English engineer would consider a line of railway, the construction of which involved a constant or an average excavation of the depth of 26 ft., to be unusually heavy in point of earthwork. The water section of the Suez Canal has, as before stated, this vertical dimension, and, as the width at the water-level is 336 ft., every mile of canal cut through a flat level country *à fleur d'eau*, may be estimated as equalling in its cubical contents of excavation ten miles of railway. If to this displacement of earthwork necessary for the formation of the canal itself over the terrestrial portion of its route, we add the contents of the 40½ miles of cutting at from 15 ft. to 85 ft. above the surface-level of the water-line, we shall be far within the mark if we double the above quantity, so that the excavation for that portion of the Suez

Canal which has not to be dredged so much below the bottom of the lagoons, is equal to that requisite for 1,200 miles of railway. To this have to be added 50 miles of dredging, the long sea-walls or jetties at Port Said, and that important and valuable work, the fresh-water conduit. It is clear that the aggregate estimate can be no trifle.

There is one point in the conduct of this gigantic undertaking which reflects the highest credit on the skilful French engineers who direct the works, and on the indomitable courage and energy of M. de Lesseps. Our readers may remember that, soon after the actual commencement of the works was announced in this part of Europe, it became matter of suspicion, or indeed of evidence, that the Egyptian Viceroy was imitating his great predecessor Necos not only in the object, and in the magnitude, of his attempt, but also in the mode of its execution. In other words, the canal was being executed by forced, if not by altogether unpaid, labour. Diplomatic representations were made on the subject at Constantinople, and the result was that the compulsory labour was prohibited. With that prohibition, many of us thought, the doom of the undertaking was pronounced. Not so thought M. de Lesseps. His able staff seized on the occasion to replace the naked human strength of the Arab by the untiring toil of the steam engine. Machines altogether new to science were designed, were constructed in the factories of France, sent out piecemeal to Egypt, and set to do navigators' work in the deserts of water and of sand intervening between the Mediterranean and the Red Sea. Powerful dredging-machines were constructed for deepening the harbour. Steam barges were built for carrying out to sea the silt and sand raised by the dredging machines, and for discharging it through trap-doors. A contrivance called a *couloir*, being an iron trough of large area some 70 yards long, is applied to catch the contents, which the buckets of the dredging-machines raise to a height of 40 ft. above the water level, and to conduct them into the discharging barges by sea, or over the banks of the canal by land; the flow of the wet sand down the *couloir* being aided by a stream of water pumped up by the engine, and discharged on the buckets as they empty into the iron trough.

The framework supporting the *couloirs* rests on an iron turntable, fixed on an iron barge, so that the direction of the great discharging troughs can be as readily changed in azimuth, as their vertical angle can be altered by appropriate tackle. Where the bank of the canal exceeds the height of 20 ft. above the water level, a second invention comes into play, a sort of *translation into steam* of the horse-run familiar to the English "navvy," for running the contents of deep cuttings into "spoil." A railway is laid by the side of the canal, on which is propelled a strong iron frame, supporting an incline reaching from near the water edge to some 50 ft. in elevation above it. The barges used in this portion of the work contain movable compartments, into which the sand is run, and these compartments, suspended by chains from gear on the incline, like the cages of a mine, are wound up to the top by the engine, and then tipped over the bank. The whole of this machinery is so arranged as to require the least possible amount of manual labour. Each elevator and each dredging-machine is estimated to raise 1,500 cubic mètres daily,—a duty which, if performed by human labour, would take the efforts of above 500 men. How many Arabs would go to one "navvy" is a sum in reduction depending on many contingencies.

As the work advances from the borders of the lakes, and the cuttings become deeper, the use of the "elevators" is discontinued, and the contents of the excavation are either conveyed in barges to the nearest lake, or run out to spoil by temporary railways, as in a civilized cutting. Locomotives are employed to draw the trains of sand, but the use of manual labour to fill the wagons has not been superseded; and here the Arab learns the meaning of the term "piecework," and the use of the shovel and the barrow. The absence of any unnecessary clothing, and the firm hold which the naked feet take of the planks, are great advantages to the wild tribes, whom the vigorous will of M. De Lesseps is thus actively "civilizing."

The engineer must look with pride at this noble effort of his art in a country where the ancient works of man were of a magnitude elsewhere unknown, and where the mighty operations of nature yet distance his utmost efforts. The dimensions which Herodotus gives of Lake Mœris, a vast reservoir, which the kings of the twelfth dynasty of Egypt, 4,400 years ago, constructed, in order to economise the precious supply which the Ethiopian rivers discharge, on the arrival of the summer solstice, to swell the perennial stream which the great equatorial lakes pour into the Nile, approach the fabulous. The Great Pyramid, built by the second king of the fourth dynasty, who reigned, according to the most reliable chronology, that of Brugsch, a thousand years earlier than Ameses II., the constructor of Lake Mœris, contains nearly three and a half million cubic yards of masonry. Such are the results of human labour in this marvellous country. But Nature asserts her pre-eminence. The whole of Lower Egypt has been formed by the Nile. The delta, formed of mud brought from the mountains of Abyssinia, is still annually driving back the Mediterranean. The untiring, undaunted resolution of our honoured countryman, Sir Samuel Baker, has cleared up that which was the greatest mystery in the engineering of Nature. He has, of his own knowledge, confirmed the statements of Claudius Ptolemy, that the Nile issued from two great inland seas, and the researches of Bruce as to the rush of the water brought by the heavy tropical rains to the mountains drained by the Atbara, along a deep channel, which is dry in summer, but filled with a torrent 30 ft. in depth in a single night. But he has done more than confirm and explain ancient tradition and later discovery: he has unlocked the whole secret of the system of the Nile, and has shown how a constant stream of sufficient volume to reach the sea, in spite of the immense loss which it sustains in its course from evaporation, is supplied by the feeders of the Albert and the Victoria Lakes, and how the sudden but yet regular afflux of the Atbara, following and overflowing the channel of the Nile, brings the annual blessing of the inundation to Egypt.

The movement of our troops, wisely accompanied by men charged with the duties of scientific observation, to this interesting region, promises to give us yet fuller details of its wonders. Already is it proposed to "tap" the inundation at its source, to divert part of the great torrent of the Atbara, to fertilise further districts of the desert, and to win new Egypts from the barren sands. The simple plan of obtaining water by driving an iron pipe into the earth is to be tried whenever our troops need a supply. With water, in the tropical climates, comes instant vegetation; and, with the growth of trees, comes change of climate. It is quite within the limits of possibility that, between the artesian wells of Algeria, and the irrigation possible, and in a measure even commenced, in the neighbourhood of the Nile system of perennial and of solstitial flow, the face of nature in Northern Africa may be more changed within the experience of a single generation than has been the case since the dawn of history. However that may be, the name of M. de Lesseps must ever be connected with one of the grandest efforts of modern engineering; an effort remarkable in design, and still more wonderful in the progress which it has made towards execution, even in the country which contains the most stupendous works of antiquity. Nor, convinced as we remain of the non-commercial character of the undertaking, would we hear without regret and vexation of the abandonment of the noble works of the Suez Canal.

We have omitted to mention one of the most novel and striking features in the engineering of the Desert. The demons who were non-plussed by the Scotch wizard, when he ordered them to make ropes of sand, appear to have obeyed on the shore of the Mediterranean a mightier enchanter, who has not only bidden them to give cohesion to sand, but shown them the way to execute his commands. By means of gigantic pug-mills, or machines similar to those used for mixing mortar, the sand of the desert is mixed with a proper quantity of lime, and then cast into great blocks of concrete. Thus the engineer not only emulates nature in the formation of water-courses, but rivals geological action in the creation of rocks.

ARCHITECTURAL UNION COMPANY.—At the annual general meeting, recently held, a dividend at the rate of 5 *per cent.*, free of income-tax, was declared, leaving (in addition to 32*l.* belonging to the auxiliary donation fund) a balance in hand of 25*l.* 18*s.* The payments included a donation to the Architectural Museum of 25*l.*

ARCHÆOLOGIC ITEMS FROM ROME.

THE diggings in Trastevere, undertaken by private speculators last winter, that led to the discovery of ruins identified as a quarter of the "Vigiles," have been already reported of in our pages; and we are glad to find they have been continued, after some interruption during the political troubles, with further results of interest. It is known that, in the time of Republican Rome, a special magistracy and civic triumvirate existed, charged to protect the city against fire, and send assistants, who were stationed at the gates, whenever a conflagration broke out, for the fireman's task. But this police gave place to a better organized one under Augustus, who instituted the so-called "Vigiles" as a fire brigade, divided into seven cohorts, each 700 strong, originally formed of *liberti*, perhaps emancipated expressly for this service, and subsequently recruited from a higher class, as in the time of Antoninus Caracalla free citizens used to be enrolled among their ranks, under the command of tribunes, centurions, and a Prefectus Vigilum, whose office was important. Their ordinary duty was the patrolling of streets throughout the night; and their chiefs had jurisdiction over cases of simple theft; of the offence of receiving stolen goods; over house-porters and fugitive slaves, which latter they were bound to bring back, if possible, to the legal masters. Under the Greek empire this organization was still maintained, but instead of the ancient designation, *matricarii* was the name given to the same corps. The Regionaries mention their barrack-quarters,—one for each cohort; and within modern date have been discovered remains of several: one under the Savorelli Palace, near the Corso; one on the Cœlian, near the Villa Mattei; another on the Aventine Hill—the Cœlian ruins the most remarkable, for there, as reported by Ennio Visconti, were found four towers at the angles of a fortified area, with walls 4 ft. thick, and a temple with octagonal cella and circular portico with porphyry peristyle—all now vanished from that site!

The spot chosen for the Trasteverine works is near a pile of Mediæval brick building, probably belonging to some baronial castle. Soon were reached walls in a good style of antique brickwork, inclosing a quadrangular area, that seems to have been a central open court; and, at the depth of about 20 ft., more or less, a pavement, in black and white mosaic, representing large figures of tritons and marine monsters floating on the sea, whose waves are rudely indicated. At one side, far from the centre, the portal of a pentagonal well, in the concrete known as *opus signinum* (from the town of Signia, now Segni), no water, but heaps of marble and terra-cotta *débris* being found in its cavity. The walls around this quadrangle have a dado 1½ mètre in height, of stucco, painted red, in many parts covered with rudely-scratched proper names and other improvised records with which soldiers amused their leisure, the most curious and frequently-repeated being in reference to tallow-candle illuminations, here called "*sebaciaria*" (a new word to enrich our knowledge of the Latin of Imperial Rome), got up in honour of the decennial and bicennial *vota* for reigning emperors or the creation of new Cæsars. Most interesting amongst these *graffiti* is one recording such a spectacle, where the name of Antoninus (or Heliogabalus) has been erased, at least intended to be so, in order to comply with the senatorial decree for the effacing of all memorials of that infamous prince after his murder, the occasion for the military *fête* here noticed being the appointment of the Emperor's cousin, Alexander, to the rank of Cæsar, A.D. 221. Other dates indicated in these *graffiti* correspond to years from A.D. 227 to 239. During the last spring was discovered a portal, opening off outside of the open court, with arched doorway, two Corinthian pilasters, and triangular pediment, the cornice and mouldings, as well as all other details, in terra cotta, altogether a most interesting and graceful specimen of architecture in such material. This doorway leads into a chamber, or (as conjectured) a *lacarium*, the interior of which is still filled with soil and *débris*; but the inner walls and arch of that ingress, now fully brought to light, display paintings in Pompeian style, and not without beauty, figures of men, birds, dragons, enclosed within red borders; the most spirited, two naked warriors, holding spears; the most graceful, a Genius, with large wings, on the keystone. The latest discovery, within the last few weeks, is another set of wall-paintings, in

similar style, in a chamber reached by another doorway, opening from the same court,—this being without architectural details,—where we cannot yet explore far, nor examine the decoration from a proper point of view, owing to the soil that still obstructs progress; but the floating figures, with the several red borderings, now visible on these walls, give the idea of a pleasing treatment, alike Pompeian as are the others. At another side of the court we enter a narrow chamber between parallel walls, roofless, that seems the boundary of the buildings at the south-west. Masons' stamps, *signa* of the usual antique character, found among these ruins, indicate dates of the reign of Hadrian; and the singular elegance of decorative details suggests periods under the Antonine emperors. Since last May the excavations have been taken from the hands of the private proprietors and carried on by Government, a notification of which intent appeared in the official paper (28th May, 1867), announcing also the purchase of the ground and the decreed demolition of several paltry houses that stood above the area, and some of which, we see, have been thrown down since we last visited this spot. The most noticeable features distinguishing the antiquities here found is the richness of taste manifest in the adornment of buildings destined for nothing nobler than a barrack of firemen, leading us to conclude favourably for the predominance of artistic feeling in Rome at the period to which they are referrible.

MALTA.*

Five questions are now agitated at Malta, and have been the subject of discussion in the public press of the island,—namely, educational reform; a civil instead of a military governor; a legislative assembly freely elected by the people; municipal institutions; and improved dwellings and sanitary measures.

Having for many years devoted a considerable amount of attention to these subjects, Dr. Casolani publishes the results of his reflections, with the view of drawing public attention in this country to the subject of promoting the welfare and prosperity of the island.

Of the fifth and last of the proposed measures we may give some idea, as these come more especially within our province.

The present sanitary establishment in the island consists of a board of health, a quarantine physician, and police. These Dr. Casolani proposes shall cease, and the duties of the establishment be performed by—1st, a standing sanitary committee, to consist of a medical man, a civil engineer, and a lawyer; 2nd, of a deputy sanitary commissioner for each of the seven districts of the island, who shall be directly responsible to the sanitary committee; 3rd, of a board of health, consisting of the committee, assisted by a military medical officer, a naval medical officer, and two lay gentlemen conversant with sanitary matters [the preliminary work of the board of health shall be that of devising a plan for a Sanitary and Building Legislative Act, by which authority will be vested in the committee for the performance of their various duties]; 4th, of inspectors of nuisances, an inspector of police in each district, under the orders of the deputy sanitary commissioner, to assist him and render all necessary aid in the inspection of nuisances and in the enforcement of all sanitary measures.

The public work department, as a branch of the collector of land revenue department, shall cease, and a separate department be created, with a civil engineer at its head, to be called the superintendent of public works, who will also act gratuitously as one of the managing members in the sanitary committee.

The works that will be required for some time at Malta for sanitary and other objects will be such as only an English engineer could execute, as the natives as yet have had no experience in designing works of sewerage, water supply, laying out of new towns, and improved buildings, or providing graving-docks and warehouses with mechanical appliances, &c.; and the convenience, comfort, and health of the people demand that such works should be no longer postponed.

The extension of the great harbour; the annexation of the French creek to her Majesty's dockyard; the prospective extension of the naval establishments, which will necessitate the appropriation by the Admiralty of buildings and dwellings now occupied by the civil population; the overcrowding of the fortified towns; the enforcement of Building and Sanitary Acts, with a view to improve the condition of buildings according to modern requirements, especially the dwellings of the working classes and poor;—all these considerations, taken in a military, naval, and civil point of view, would require the action of Government, it is suggested, to provide or encourage the formation of a new town, well removed from the fortifications, and built under the most stringent regulations as to sanitary arrangements.

The fortified towns, Valetta and Floriana, with the three Cottonera cities, when originally planned were not intended to contain the very dense population they now hold. The houses, particularly in Valetta, during the existence of the Order of St. John were spacious, with ample quadrangles, consisted in many cases of one groundfloor, did not generally exceed the height of one story, and were thus wealthily inhabited. They are now so changed and pauperised that often they are left without any court-yard at all, and are divided and laid out in ten or more unhealthy and separate tenements, each having an independent entrance. Often each house is turned into a so-called "carreja" (lodging), or tenement house, in which twenty or more rooms are separately let to as many families, with but one privy in the cellar for the common use. The cellars, too, are converted into human habitations, sometimes into filthy stables.

The fatal influences and evils arising from this overcrowding, which must necessarily increase every year on account of the towns being enclosed within fortified walls, thus rendering impossible any extension of building area, are sufficient to neutralise whatever in other respects may be attempted for the improvement of health.

What Dr. Casolani proposes is to obtain a tract of land well removed from the fortifications and naval establishments, and there to build a town, having easy access by an American tramway to all parts of the mercantile establishments along the harbour and to Valetta. The most desirable site for this purpose, he thinks, is the land extending from near the new extension of the Great Harbour to the gentle slopes surrounding the beautiful plain of the Marsa. Such a town, he remarks, should be ultimately complete in itself, having its own model drainage (without contaminating the sea) and utilizing the sewage in the surrounding country, water-works (supplying water at high service), gas-works, and places for worship. Public baths, wash-houses, race-courses, playing-grounds, and such like gymnastic institutions, might also be provided. The plain he would convert into a park.

A Building and Sanitary Act should be previously passed by the Government Council, which should be so enforced that the buildings might be erected upon the most approved modern system, with stringent specifications to ensure proper sanitary arrangements and appliances.

The only means, in Dr. Casolani's opinion, to improve in a sanitary point of view the present dwellings in Valetta, where building space is so valuable, is by altering the plans now existing, and building large blocks in "flats," not only for the working classes, but also for those in a superior position of society. Two such dwelling-houses have been lately built in Valetta upon his plans and under his direction,—one in Strada Mezzodi, consisting of four flats, with a house adjoining (built in the style of the Belgravian houses); and the other in Strada Mercanti, called "Camerata," a large block of building,* consisting of 103 separate and independent apartments (with twelve more apartments not yet completed), and twenty-one store-rooms. They are both arranged with attention to sanitary principles, and have already, it seems, given most satisfactory sanitary results.

The formation of a commercial dock is one of the suggested improvements.

* Suggestions with regard to the General Administration and Internal Affairs of Malta. By Charles Casolani, M.D. London: Lane, Stran 1867.

Munificent Gift of Earl Somers.—The castle grounds, so beautiful in themselves, so full of historic interest, and so desirable from their position, are, by the liberality of Earl Somers, to become the property of the town of Reigate.

* This building, which is constructed of solid stone, is the first instance in which the stone has been hewn, and the mouldings turned entirely by machinery, in Malta.

THE COURTS OF LAW COMPETITION.

Our readers have been kept fully informed on this subject. They knew before Mr. Hunt replied to Mr. Beresford Hope's questions in the House of Commons, as to the appointment of an architect, that the Treasury received a communication from the judges, stating that they had been unable to arrive at a decision that any one design was the best; and had recommended the appointment of two gentlemen for the joint preparation of a final plan. The reply of the Treasury was, that that recommendation was not such an award as they had expected that the judges would have made, and they referred the matter back to them, in the hope that they might be able to agree in selecting some one architect to recommend to the Treasury. On the 28th of November, Mr. Hunt went on to say, a further report was received from the committee, stating that they adhered to their original conclusion, and that under these circumstances the Treasury proposed to do what the law prescribed, namely, to seek the advice of the commissioners.

On the 10th of December the Treasury did accordingly forward the report from the judges to the commissioners, who met to consider it on the 13th inst., and directed the following reply to be returned by their secretary:—

"I am directed to acknowledge the receipt of your letter of the 10th instant, transmitting to me the copy of a communication from the chairman of the Committee of Judges of Designs, in which the judges state their regret that they could not agree to make such an award as was contemplated in the Treasury minute and the instructions to the architects.

You do not acquaint the Commission with what object (except that they may be informed of what has occurred in the matter), this communication is made to them; but their attention has been called to the reply given on the 29th November last, by their lordships' financial secretary, to a question in the House of Commons, in which Mr. Hunt stated that in this matter 'the Treasury propose to do what the Act of Parliament laid down, and to seek the advice of the Commission.' The Commission accordingly conclude that the letter from the Judges of Designs is sent to them in order that they may advise the Treasury upon it.

The Commission desire me to observe that in strictness the Courts of Justice (Building) Act, 1865, section 4, only requires the advice of the Commission as to 'the plan upon which the buildings shall be erected, and the necessary arrangements for the proper or convenient accommodation of all the courts and offices to be provided for therein and for proper accesses thereto.' The selection of the architect rests with her Majesty's Government. And the arrangements under which the concurrence of the Commission with the Treasury, in this and other preliminary steps for preparing the plan, was ensured, are based on the Treasury minute of the 23rd December, 1865, adopted by the Commission on the 15th January, 1866.

In advising, therefore, the Treasury, at the present juncture, the Commission are not acting under their statutory powers.

I am, however, to state that it appears to them most desirable that the selection of the architect should be made in accordance with the terms of the memorandum which forms sec. 56 of the instructions to the competing architects, signed by Lord Cranworth on the 17th April, 1866, and that the opinion of the Attorney-General, by whom all questions which may arise on the interpretation of that memorandum are to be determined, should be taken whether the decision of the seven judges should be recognized as naming Messrs. Barry & Street the two equally successful competitors, so that they may be jointly employed accordingly, if prepared to accept such employment, and to share the architects' commission on the conditions already settled."

Here the matter now rests. The Instructions to Competing Architects, referred to, commence thus:—

A payment of 800*l.* to be made to each competitor, except the successful one, who is to be employed as the architect of the building.

The architect employed shall receive 5 per cent. commission on the amount of the contract or contracts, and on any extras the amount of which shall have been distinctly and previously authorised by the Treasury."

These instructions evidently contemplate the selection of *one* of the competitors as the architect to be employed; but, as it seems to us, they say nothing which should prevent the selected competitor from associating with himself by arrangement another of the competitors, and there would probably be no real difficulty in making the recommendation of the Judges of Designs perfectly in accordance with the memorandum. Under the circumstances, this is the arrangement we hope will be carried out. Candidly, we shall not be contented with Mr. Street's elevations, nor will the public be. We should prefer to that Mr. Barry's design carried out in its integrity. But the actual design, in consequence of the conjunction, must necessarily be a new one, and if the abilities of the two gentlemen named be brought to bear upon it, with all the light that time and discussion have given, we shall have little fear as to the result. A second competition is out of the question: such a step would destroy confidence in all future Government competitions.

It may be worth mentioning that Mr. W. J.

Gardiner, the surveyor appointed by the Treasury to test the estimates of the several competing architects, has added to each of them from 200,000*l.* to 600,000*l.*, with the exception of Mr. Waterhouse's, to which he has made but a slight addition, 1,421,430*l.* instead of 1,419,842*l.* Mr. Barry's, sent in at 1,277,571*l.*, he puts at 1,610,966*l.*, including subways: Mr. Street's, called 1,330,510*l.*, at 1,523,273*l.*, subways not included; and Mr. Scott's, sent in at 1,277,326*l.*, he brings to 1,726,494*l.*, including subways, but not the glass roof over Bell-yard, or statues. The insufficient evidence on which the commissioners fixed the probable cost of the necessary buildings is strikingly shown by the fact that in the case of half the designs the cost is estimated at nearly a million of money more than the sum named, 750,000*l.*

THE PLAY-SCENE IN "HAMLET."

THIS is the engraving produced by the Council of the Art-Union of London, for the subscribers of the current year; and the latter may be congratulated on the opportunity of becoming possessed, by the outlay of a guinea, of a work which no publisher could sell for less than double that amount. Virtually, in fact, they get the print for half that sum, the balance being handed to them to lay out in pictures and other prizes.

The original picture by Daniel Maclise, R.A., is always a great point of attraction at South Kensington; and, for dramatic conception and powerful treatment, it is amongst the finest works of the British school. The picture is one that will repay long and close study, as, besides the broad and prominent features which at once catch the eye,—the intense earnestness with which Hamlet watches the effect of the play on his uncle, the convulsive clutching of the fingers of the latter, and the angry and suspicious glances of the soldiery, amongst whom there has doubtless been much speculation on the sudden death of the old king,—there are many minor points which come out by degrees, and show how carefully the artist has aimed at making all the canvas conducive to an illustration of the main purpose. Note the figures of Justice and Mercy on either side of the proscenium, while the tapestry is seen to represent on one side the Offerings of Cain and Abel, and the Death of Abel; and on the other, the Temptation, and the Expulsion from Paradise.

The picture has been powerfully translated into black and white by the burin of Mr. Sharpe, with a fine bold sweeping line worthy of the old English masters in this manner, combined with graceful and delicate finish. It may be worth observing how very little people in general know about the *time* required to produce such a work as this. The mixed style, or chalk method, as it is technically called, requires a much shorter period for the production of a plate, and, with mezzotint, is now almost exclusively adopted by the publishers of engravings.

The plate now in question was begun in September, 1860, and finished in December, 1865. The printing has been proceeding ever since the latter date, for a great part of the time by night as well as day, the work being constantly carried on by relays of workmen at the press—only about *twenty-six* impressions being produced in *twenty-four* hours. It is stated that the issue of copies to the subscribers will begin in February next.

The compact little almanac of the Art-Union contains information on the several art-institutions of the metropolis, and meetings of scientific and literary associations—not to be found in a combined form in any other work—in addition to other artistic memoranda and the usual matter given in almanacs.

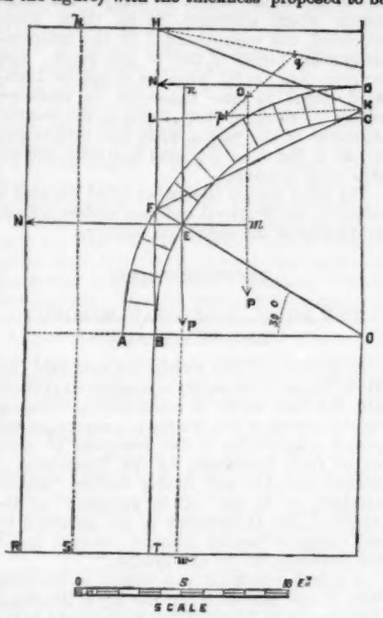
BATH ABBEY RESTORATION.—A public meeting has been held in the council-chamber at Guildhall, Bath, for the purpose of receiving a report from the committee who are superintending the restoration of the abbey. The attendance was not large, but the meeting was a satisfactory one. The report urged the desirability of further subscriptions for the completion of the ceiling decoration, which would require 2,200*l.* more to finish it as it ought to be. Resolutions in accordance with the tenor of the report, and pledging the meeting to renewed exertions, were passed, and the committee re-appointed.

STABILITY OF ARCHES.

THE analytical methods by which the thrust of an arch is calculated, and the necessary strength to be given to the supporting pier, involve a considerable amount of algebraical formulæ, by which those who are able to apply them have the power of calculating the thrust of any given arch to the greatest nicety. To the practical builder, however, these very accurate calculations are not essential, and he is quite satisfied with some easy rule-of-thumb by which he can obtain something approaching the true result.

The following is an approximate method of measuring by scale the thrust of any given arch, and of finding the necessary thickness of pier to enable the structure to stand without rupture.

The section of the half arch must be drawn (as in the figure) with the thickness proposed to be



given to the pier or abutment, and the height of the surcharge. I here suppose that the arch, pier, and surcharge are built of the same material, and have the same specific gravity. The tendency of the arch, when the pier is too weak and the surcharge too heavy, is to fracture by the crown sinking and the joint opening at C, so that the pressure of the opposite half acts at D: this causes the reins to spread out, and the joint EF to open at F; so that the whole arch breaks up into four pieces; the other joints being kept from opening by the adhesion of the mortar. In the semicircular arch, which I take as the simplest example, the joint EF, one-third of the distance from B to C (so that EO makes an angle of 30° with OB) is found to be the weakest, or that at which the thrust from the other half-arch has the greatest effect.

When the arch is about to break, the thrust of the other half-arch acts horizontally at D, and its moment about E is equal to the moment of the mass HFECI (acting at its centre of gravity, G) about the same point, E. If we call N the thrust at D, En (y) is its vertical distance from E; then N . y is its moment about E. Also, if P is the weight of HFECI acting at G, Em (x) is the horizontal distance from E of a vertical from G; and the moment of P about E is P . x. Then, just before fracture,—

$$N \cdot y = P \cdot x, \text{ or } N = P\frac{x}{y}$$

Hence we can calculate the value of N; and, by the principles of mechanics, we may now suppose N and P to act at E, in directions parallel to their original ones. The weight of HFECI can be very nearly measured by taking CK = ⅓ CD, and drawing FK; then the weight of the trapezium HFKI is sufficiently near that of the figure HFECI for all practical purposes. To find its centre of gravity, draw HK, dividing it into two triangles, HFK and KHI: bisect HF in L, and take Lp = ⅓ LK; then p is the centre of gravity of HFK. Similarly q is the centre of gravity of KHI. Join pq, and divide pq so that $pG : qG :: KI : FH$ (by Euc., bk. 6, prop. 10). Then G is the centre of gravity of the trapezium HFKI. The weight (P) of the trapezium is the sum of the weights of the two triangles, namely,—

$$\tfrac{1}{2}\,HF \times HI + \tfrac{1}{2}\,KI \times HI.$$

Draw the perpendicular, Gm, and the horizontal line Em (x). The horizontal line Dn being the direction in which N acts, draw the perpendicular, En (y): then—

$$N = P\frac{x}{y}$$

In the figure OB = 10 ft., AB = 1½ ft., DI = 2½ ft., BT = 10 ft., HF = 8 ft. 2 in., HI = 10 ft., IK = 3 ft. 6 in., $Em = x = 3$ ft., $En = y = 6$ ft. 6 in., $Sw = 4$ ft. 10 in.

$$\text{Therefore, } P = 8.2 \times 5 + 3.6 \times 5 = 58.4,$$

$$N = \frac{58.4 \times 3}{6.6} - 27$$

Now, consider P and N, having the above values, as acting at E parallel to their original directions. The force tending to overthrow the pier is N × Ew. In the figure Ew = 15 ft.; so that, the force to be resisted is 27 × 15, or 405. To find the resisting forces, first let TS be the thickness of the pier (3 ft. 6 in.); then the forces are P at E multiplied by Sw, and the weight of SH multiplied by ½ ST; that is

$$58.4 \times 4.10 + 24 \times 3.6 \times 1.9 = 429.$$

This being slightly in excess of the moment of N, the structure will be just in a condition of equilibrium, and any slight additional weight laid on the arch would cause it to thrust out the pier.

Hence it appears that in a permanent structure where stability is required, the pier must be much more than 3 ft. 6 in. Now, take RT = 6 ft. as the thickness of the pier; Rw = 7 ft. 4 in. The moment of N remains the same, as the height of the pier is unaltered. The sum of the moments about R of the resisting forces is

$$58.4 \times 7.4 + 24 \times 6 \times 3 = 860.$$

This is rather more than double the overturning force, and therefore the pier would be amply thick enough to insure permanent stability to the structure. By this method the stability of any pier supporting an arch can be calculated without the use of algebraical formulæ.

The problem of finding the exact thickness that must be given to the pier, whose height is known, can be easily solved by means of a quadratic equation.

Taking the dimensions in the figure, and calling t the thickness of the pier, $Sw = t + 1.4$, if ST is the thickness of pier when the structure is just in equilibrium; then the equation for equilibrium is—

$$58.4\left(t + 1.4\right) + 24t\,\frac{t}{2} = 405$$

or, $36t^2 + 175t - 996 = 0$

whence, $t = 3{\cdot}36$ ft., very nearly 3½ ft.

To insure permanent stability, we must multiply 405 by 2 the *coefficient of stability*, and then the equation is—

$$36t^2 + 175t - 2211 = 0$$

whence, $t = 5{\cdot}82$ ft., or nearly 6 ft.

The same methods can be applied to Gothic arches, only the joint FE will vary according to the pitch of the arch, as shown in my paper on that subject in the *Builder*, March 31, 1866; in the equilateral arch the angle EOB being 16°. Also in Gothic arches it will be necessary to take the point K considerably *below* C.

E. WYNDHAM TARN.

THE DEATH OF THE TOWN SURVEYOR OF NEWCASTLE.

Mr. BRYSON, the town surveyor of Newcastle-upon-Tyne, has expired from the effects of the injuries sustained in the attempt, of which every one has heard, to get rid of a quantity of blasting powder, or nitro-glycerine, which had been improperly stored in the town.

This has been a sadly mismanaged business altogether. The mere exposure of such a substance even on an open moor was by no means a safe way of getting rid of it, as any unfortunate who might have happened to walk across the moor would have found to his cost. Sinking it out at sea with weights attached would have been better; but surely chemists could have pointed out some way of safely destroying it.

Very different opinions appear to be entertained as to the manageableness of nitro-glycerine. The *Chemical News* says that methylated spirit renders it quite inexplosive till required for use, when water separates it as good as ever, and that wood naphtha also renders it harmless in a similar way; but in frosty weather there is danger of it crystallizing even then, when it becomes explosive as before. Mr. J. L. Bell, a chemical manufacturer, was a witness on the inquest, and said that nitro-glycerine, particularly if impure, is liable to spontaneous decomposition at ordinary temperatures. The gases given off, if confined to the vessel containing the nitro-glycerine, exercise pressure on the remaining liquid, which is then liable to explosion under the least shock or slightest movement. Again, if this substance is brought from a cool place and exposed to a temperature of from 68 degrees to 75 degrees Fahrenheit — all these being very common temperatures — decomposition takes place, pressure ensues, and explosion may be the consequence.

The thirty canisters stored in the town, he said, if they contained two gallons each, would hold 960 lb. Had this been pure glycerine it would have been equal to 4½ tons of gunpowder! and it was stored where percussion, motion, or a moderate temperature might have caused explosion. Comparing the effect of such a quantity of pure nitro-glycerine with the effects stated to be obtained in the pamphlet issued by the Nobel Company, of Hamburg, by whom the compound in question appears to have been manufactured, it would have been sufficient to have blown down 115,000 tons of solid rock. Mr. Webb, the chief agent of this company, alleges that nitro-glycerine is not so dangerous as gunpowder, which seems to be rather a stretch of trade tactics. He says he carried 10 lb. weight of it on one occasion to France in his pocket. This must have been a pretty large pocket-parcel. Accidents in his quarries, he said, had diminished in number since he began to use nitro-glycerine, and it was constantly used now in slate quarries. It was the way in which it was handled, Mr. Webb says, that led to all the mischief in Newcastle. In all, seven persons have been killed in this affair; the sheriff himself, who had the management of it, amongst the number. It is said he was acquainted with chemistry.

The jury returned the following verdict:—

"That death has been caused by the explosion of nitro-glycerine accidentally; and the jury are unanimously of opinion that the law in reference to the storing of nitro-glycerine has been grossly violated in this case."

The jury would not allow any of the nitro-glycerine canisters to be brought into the room, and a clergyman who had a piece of slag with him was ordered to take it out, as it was supposed to be nitro-glycerine.

ON ART, ESPECIALLY SCULPTURE.

Under this title Professor Westmacott is delivering an interesting course of lectures, under the Cantor bequest, at the Society of Arts. In the course of the second lecture he gave a rapid review of the different schools of sculpture from the most ancient period. The monuments of Egypt probably mounted up to not less than 2,000 years before the Christian era. The sculptures brought from Nineveh and its neighbourhood, exhibited a comparative perfection of workmanship that showed long practice; yet we knew that the wonderful city from whose ruins they were exhumed, was utterly destroyed above 600 years before Christ. This comprehended a period of nearly 2,500 years, and many of the sculptures must have been executed long before this event. At about 450 years before Christ, sculpture, hitherto treated without reference to any art-excellence, began to be practised on a new basis. It was then not only used to illustrate the religious myths and heroic deeds of the Greeks, in the rude style of the earlier time, but the principle was introduced that these noble subjects should have their expression in the most perfect forms. Then began an entirely new phase of art, most important in its history, which made Beauty a condition of its practice. The school which ranked highest in this noble achievement was that under Phidias and his contemporaries, when the most sublime subjects were represented under the most majestic and dignified forms. To this succeeded the school of Praxiteles, who, departing from the more severe and pure treatment of the previous artists, made beauty itself the object and end of art. This, though the subjects were still religious, introduced a sensuous style, in works of exquisite and attractive execution. It was a downward step in art, because it made its appeal to the eye and sense alone, and not to the purer and more noble sentiments. After this came the school of Lysippus, which still further deteriorated from the high standard of the greatest masters. He was the favourite sculptor of Alexander the Great, and it was under that ambitious, self-glorifying monarch that portrait-sculpture was first introduced. Here individual character and details were studied, instead of the larger general type of form seen in the most perfect works of nature; and, although productions of great merit were supplied by the sculptors of the period, and for some short time after the death of Alexander, the most perfect style of art ceased to be the object of study. The time during which sculpture, in its finest form, flourished, was comprehended in the comparatively short period of 200 or 250 years. The lecturer then traced what he called its downward course to later times—to its existence among the Romans, where, owing to the peculiar character of the nation, what was termed fine art, as it had been practised in Greece, excited little or no sympathy.

The third lecture (December 20th) included a review of the Mediæval and more modern schools to the close of the eighteenth century.

THE ROYAL HIBERNIAN ACADEMY AND STATE AID.

A meeting of this society has been held (Sir Thos. Deane in the chair) to consider its position and the best means of promoting its interests. On the motion of Mr. Mulvany, a resolution was passed complaining of the retention of their report from Parliament by the Department of Science and Art, and stating further "that in assuming to be the 'official superiors' of the Academy, the Department is not sustained by any known or implied relations between it and the Academy, nor by any bye-law."

A second resolution was passed to the effect that in the interest of art the Royal Hibernian Academy is as fully entitled to State aid as the royal academies of England and Scotland.

Mr. J. H. Foley, R.A., in speaking to this resolution, said,—I do so in the full conviction that the aid hitherto granted by the Government to the Royal Hibernian Academy, namely, 300*l.* a year, is wholly insufficient for the successful working of the institution, and I cannot but contrast the support it thus receives with the support accorded to the Royal Academy of London, of which I have the honour of being also a member. The latter-mentioned institution has been designated a self-supporting institution, but I beg leave to differ from those who deem it such. From its infancy the Royal Academy has been provided by the Throne or the Government with a home, and I cannot but consider the value of that home at some thousands a year. The gift of Burlington House and portion of adjoining land may be fairly estimated as a gift of 80,000*l.*, which sum, if funded, would produce an annual income of 2,400*l.*; and I am strongly of opinion, considering the circumstances of this country, that the support given by the Government to the Royal Hibernian Academy should be even greater in proportion than that given to the Royal Academy of London.

A deputation was appointed to see the Chief Secretary for Ireland on the subject.

FROM MELBOURNE.

A deputation from the provisional committee of the proposed Museum of Industry and Art, waited recently upon the hon. the treasurer for the purpose of being put in funds for initiating the project. It was explained by the deputation that a very large and valuable collection of specimens of raw material was already stored within the Exhibition buildings, and it was most desirable in order to keep faith with those who had presented them, that steps should at once be taken to make the collections accessible for inspection. To do this, money would be required to provide suitable cases, as also the necessary attendants, before the Museum could be open to the public. Mr. Verdon expressed himself favourable, but could not at present do more than keep the scheme afloat. He hoped, however, that in the next session of Parliament a Bill would be introduced which would embrace the objects contemplated.

The Gipps Land Hospital, at Sale, was opened on 20th August last. It originated with a small society for the relief of casual cases of sickness or accidental injury among indigent strangers, who were then frequently coming into Gipps Land in search of employment on public works or at the mines. Funds were collected, plans invited, and eventually that of Mr. Anderson, a local architect, was adopted. The site is a reserve of five acres upon the plains, on the limit of the township of Sale, and immediately adjoining a reserve, of similar extent, for a benevolent asylum, and another laid out as a botanic garden, which last the borough council are now improving. The external appearance of the building (which is of brick) is picturesque, as shown in a very fair engraving in the *Australian News*. The front door leads to an octagonal hall, having on the right a consulting-room, and on the left the dispensary. The hall will be used as a waiting-room for out-patients. Passing through folding doors into the passage beyond, on either hand are long wards, for male and female patients respectively; and behind these are closets and bath-rooms. Up-stairs is the operating-room, well lighted from above, several small wards, and the apartments of the matron and steward. The nurses' rooms all open into the several wards to which they are attached. The same provision is made on this floor as on the lower one for baths, &c. The plan is one that admits of additions being made to the building from time to time should they be required.

MURAL DECORATIONS.

PAINTINGS AT WALLINGTON, NORTHUMBERLAND.

At a recent meeting of the Royal Institute of Architects, Mr. W. B. Scott laid before the members examples of the paintings with which he has recently decorated the mansion of Sir Charles Trevelyan, at Wallington, as before now described in our pages, and read a paper descriptive of the undertaking. We avail ourselves of a portion of it, and of a few of the illustrations accompanying it.

The house was built about 130 years ago, at a time when a fashion prevailed of dispensing with lobby, hall, or ante-room, the principal entrance opening directly from the lawn or drive into the central and principal room of the house. At Wallington the central room of the front is the drawing-room, and the principal entrance still remains there, now only used occasionally. The plan of the house, which is very large, was a quadrangular mass of building the inner wall (to the quadrangle) being pierced with windows lighting a corridor on the ground-floor all round three sides, a similar corridor above also all round three sides, the fourth side giving light to the great staircase. The entrance being as already described, the great staircase was altogether apart from it,—could, indeed, only be reached through the principal rooms of the house. Besides, the quadrangle enclosed by the high blank walls, was a damp inaccessible court. To change the plan and convert this court into a saloon was intrusted to the late Mr. John Dobson, of Newcastle, who attained his object by taking the entire inner wall on three sides down, and in its place making two arcades, the lower one of solid stone piers and arches, the upper supporting a ceiling of the form called, by an Italian phrase, *à schifo*. Besides being coved on four sides at the wall line, it is divided by the beams into square coffered panels, in the centre of each of which are large hemispherical glass lights, specially cast in one piece by Messrs. Swinburne. These being very thick and heavy have obviated the constant trouble, in a wet and windy climate, caused by top glazing of any description involving sashes and putty. They are globular, like watch-glasses, slightly obscured in the making, and insure all the year round an equable shadowless light as long as day lasts, showing the decorations and pictures in an unexceptionable manner. Here for once, Mr. W. B. Scott thinks, the difficult problem of lighting picture galleries has been solved,—whether applicable at a lower height and other circumstances he cannot presume to say. The fourth wall, that protecting and partly supporting the great staircase (the south side) Mr. Dobson treated in a way to preserve the unity of the apartment. The lower part necessarily re-

maining intact, he faced it with solid stone pilasters and arches, and built up the arcade on the side opposite (the north side) to correspond. Thus the saloon had, on the ground floor, two sides, each showing four panels or recesses, inclosed by stone pilasters and arches, admirably adapted for painting, and out of this grew the scheme of decoration now being referred to—namely, eighteen illustrations from the old ballad of "Chevy Chase," fitted for the angles and spandrels of the upper series of arches. The section shows their position.

The house being a Border mansion, the decoration was treated with reference to Border history. The eight panels were fitted with a series of pictures, the subjects of which began with the Roman Wall, which ancient fortified barrier passes not far off, and ends with the Industry of the Tyne—four ancient and four modern incidents in history:—

1. The Building of the Roman Wall.
2. King Egfrid offering the Bishopric of Hexham to Cuthbert, Hermit on Farne Island.
3. A Descent of the Danes on the Coast.
4. Death of the Venerable Bede.

And on the opposite side, the later subjects,—

5. The Spur in the Dish,—the Sign to the Mosstrooper that the Larder was empty.
6. Bernard Gilpin taking down the Gage of Battle in Rothbury Church.
7. Grace Darling and her Father saving the Shipwrecked Crew.
8. "Iron and Coal,"—the Industry of the Tyne.

The stone pilasters dividing these pictures, and the solid piers corresponding to them on the two arcaded sides, are partially decorated. The stone is of a very light-coloured close texture, very agreeable in tone, and the experiment of painting foliage in ordinary oil paint without any preparation or "grounding" whatever has been completely successful. Such grounding would, of course, hide and lose the surface of the stone, which it is so desirable to retain in its natural state; and there is no difficulty in doing so. There is, indeed, a little difficulty in getting the paint, laid on with an artist's small sable brush, to overcome the grit and show a uniform surface; but the difficulty is only one involving a little more time, and it may be safely affirmed such painting is unchangeable, and, as to its duration, will assist in preserving the stone itself. In the spandrels above surmounting these pedestals, the surface being plaster and the decoration to be done by degrees by various hands, the painting was executed on prepared linen cloth, which was cut exactly to fit the shape of the spandrel, and applied by a mixture of glue and paste, the plaster being previously well saturated with oil and paint.

The subject, as we have said, is the old Border ballad of Chevy Chase, and is divided into four parts, each part to occupy a side of the apartment. It is the history of a day and a night, from sunrise to sunrise, the angle at which the last picture joins the first happily coinciding with the period of the morning and the aspect of the sky in both. The period of twenty-four hours affords all varieties of aspect,—morning, noon, evening, moonlight, and dawn.

In No. 1 we have the Departure, seen from the Battlements; in No. 2, Earl Percy parting from his Wife; No. 3, the Retainers trotting away; and so forth. Then comes the Hunting, one of the illustrations of which, the Battue, we give. In No. 10, tidings are brought of the approach of the Scots, and the battle begins. The two compartments showing the advance of the English Bowmen and the Scottish Spearmen closing in we reproduce (Nos. 11 and 12). After other incidents of the battle come those of the next morning, ending with Percy's Body found by his Wife, and the Return with the Dead to Alnwick.

At the close of the paper,—

Mr. Seddon said,—The decoration of architecture by painters of eminence, such as Mr. W. Scott, was unfortunately a rare occurrence in these days. Members would therefore gratefully hail this series, in which the subject was most poetically conceived, and the difficulty of adapting the designs to the forms of the spandrels was very happily overcome.

Professor Donaldson.—All must be aware that the Border regions are particularly rich in the minstrelsy of those parts which describe the forays and attacks both of Scottish and English passing each other's borders, and the meetings of large bands of brave warriors nourishing the deepest hatred to each other, and the desire to avenge previous unsuccessful incursions. Therefore the mixing up of such illustrations of history is peculiarly interesting in buildings in that part of the country. I recollect that, when I had the honour of visiting Alnwick Castle with the Duke of Northumberland, in company with the Cavaliere Canina, Mr. Salvin, and the late Professor Cockerell, we were debating together on this subject of pictorial decoration, and his grace subsequently directed a series of paintings to be executed for the decoration of the walls of the castle; and the result has been a pictorial illustration of a succession of very remarkable historical incidents. It occurs to me that the mural paintings as we find them in Italy are particularly well suited to this style of decoration, and copies of some of those great pictures have been produced in a very admirable manner in Stafford House. It shows how painting allies itself to architecture, and gives a deep interest to all the styles described. It is the more happy when it records the history of the country in which such buildings are situated. There is one question which arises in my mind as to the mode in which this work has been carried out. At Mr. Hope's house in Piccadilly, which I built, we had canvas glued on to the plaster of the wall, of a very rough texture indeed,—so rough, in fact, that you could see the grain through the ornamentation. This ornamentation was painted on a ground of gold, of light diaper pattern. The effect of the texture of the canvas and the gold is an extremely rich surface. It was mentioned in the paper that the texture of rough canvas would not look well, but in this case it does; and the same thing is carried out very much in France, and in other places in England it has been adopted. There is much practical experience yet to be learnt in the mural decoration of buildings: first, in the mode in which it is to be carried out, and next in the selection of historical and interesting incidents for illustration, as has been done on the walls of Sir Walter Trevelyan's house.

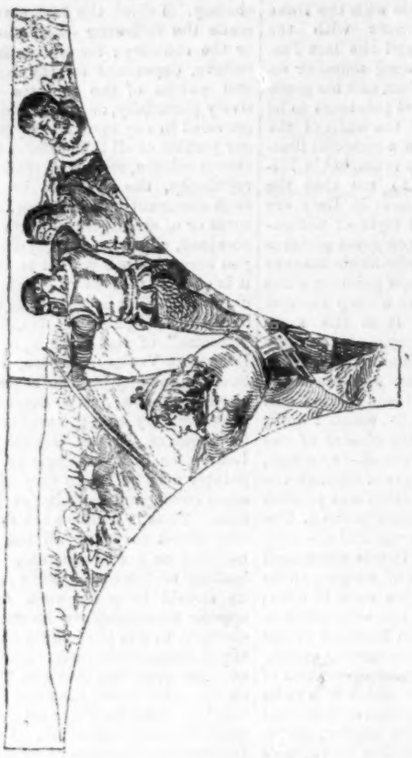
Sir Charles Trevelyan, in the course of an address, stated that the three sister arts of architecture, sculpture, and painting, all contributed to the decoration of the room; and, although on a small scale and in a humble way, they stood there in the relation in which they ought to stand to each other. In the centre was a group by Woolner, representing a Christian mother teaching her child to pray, as the highest type of modern civilization. The pictures by Scott commenced with the building of the Roman wall, and ended with the High Level Bridge at Newcastle. The wild flowers of Northumberland had been painted on the pilasters by many an affectionate and friendly hand, and the whole were connected by the stirring and affecting incidents of the hunting of Chevy Chase round the spandrels of the arches.

Mr. G. E. Street said, the architect owes an immense debt of gratitude to the painter who will undertake to paint anything to decorate a wall. If there is one difficulty more than another which stares us in the face it is that of persuading a painter to look upon such work as this as anything but a picture to be hung on a wall, and not to assist in effect the architecture of the place which is best seen when adorned in this way. We therefore owe immense thanks to Mr. Scott for what he has done. If this experiment answers, and if the effect of the light is such as enables you to see these oil paintings without glare and as satisfactorily as distemper on the face of the wall, it will solve one of the great difficulties which one has now to encounter in getting an artist like Mr. Scott to do work in out-of-the-way places. Very few painters like to leave London to do their work. If Mr. Scott can execute this work here; if it is not damaged by damp; if it is to be well seen, and the effect of the colour is *flat* enough to be seen, it will be an enormous advantage to have the chance of seeing some of these buildings decorated in a way which, without such assistance as Mr. Scott has given, we are hopeless of seeing.

Mr. Burges.—I agree in the opinion that it is of importance to get painters of eminence to decorate walls, but I must say I think these are treated too much like oil pictures. I think they would have been better done in distemper or fresco, and in much brighter colours. It also appears to me that a more uniform tone is required. If we are to have the assistance of artists like Mr. Scott decorating the walls of houses or churches, I would express a hope that we shall have less of the Venetian school and more of the Tuscan than we have had hitherto.

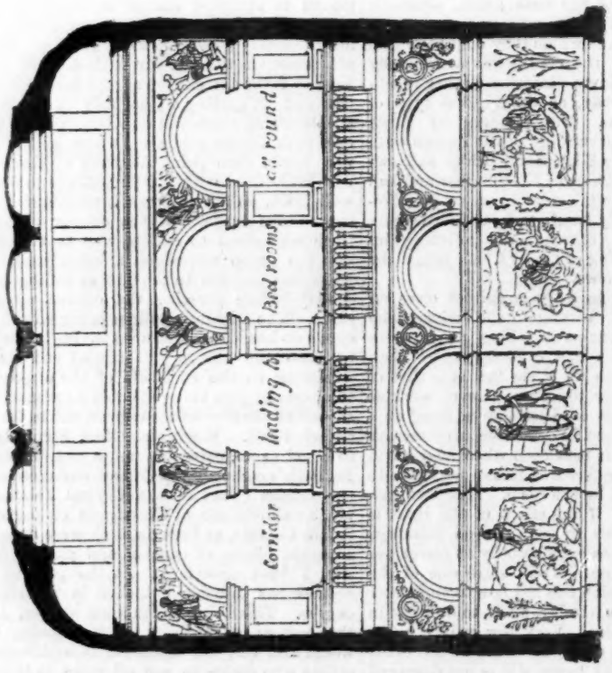
Mr. M. Digby Wyatt.—One word on the point just alluded to with respect to uniformity of colour in any series of pictorial subjects, combined with the different architectonic parts of any apartment decorated throughout in polychromy. I think the last speaker should have made the following distinction,—the necessity, or the contrary; for any such uniformity is, I believe, dependent on the relative importance and extent of the surfaces decorated respectively pictorially, or in conventional colour only: provided in any apartment you cause the leading portion of all the surfaces to be decorated in strong colours, repeating themselves with simple regularity, the eye will be satisfied whether such dominant portions assume the form of pictures or of architectural parts only. If you have obtained, any how, your symmetry in the major, you may dispense with it in the minor. Hence it is obvious that in cases where the main polychromatic effect is dependent upon the colouring of a series of paintings (as, for instance, in the "Stanze" of the Vatican, or the Scuola di San Rocco, at Venice). There, I agree, you must have uniformity in the scale of convention of any such series; but in cases where the pictures are secondary, and the architecture primary (as, for instance, in the Galerie d'Apollon, of the Louvre, or in the Loggie of the Vatican), the painter may be left to vary his style of *chiaroscuro* colour and handling at his own good pleasure. Thus it becomes the duty of the decorative artist to study all the conditions of the building he has to decorate. Where he sees its leading architectural parts are thoroughly good he should keep his work down, where they appear unsatisfactory he must put out all his strength to win the eye for his own department. If the architectural parts are good, but monotonous, he must run into and break them up; if, on the other hand, they are but "*disjecta membra*," he must tie them together and harmonize them with his decoration. I believe these to be the correct principles on which decorators should act in such matters: it is that which was adopted by Raffaelle, Giotto, Luini, and Pinturicchio, who were perhaps the most harmonious mural painters whose works remain to us. With regard to applying canvas to wall and ceiling surfaces, I would warn artists who have it to do not to employ glue or paste. The best mode of attachment is to paint the surface to which you have to make the canvas adhere well with white-lead and oil, getting a good body on it, and while still tolerably green put on a thick coat of white-lead with a little gold size, which makes it set very hard; then paint the back of the canvas with white-lead with a little gold size, and rub it well down, so as to cause it to adhere evenly: the fibrous texture of the canvas causes the fresh white-lead to adhere well to the canvas, and the green white-lead adheres well to the white-lead applied to the wall or ceiling surface shortly before pressing the canvas up in its place. The sticking medium being mixed with oil, damp has little effect upon it. If glue or paste be used the canvas will expand and contract according to the condition of the atmosphere, the paste or glue being affected hygrometrically as well as the fibre of the canvas, and in time will detach itself. When Mr. Alfred Stephens was so good as to paint for me a reproduction of Raffaelle's ceiling of the Camera di Segnatura, for the Italian Court of the Crystal Palace, and Mr. Smallfield one of Perugino's ceiling of the Saladi Cambio, at Perugia, both were done upon separate pieces of canvas, and put up in the way I have described. At the present time neither has become detached in the slightest degree. This being a practical matter, I take the present opportunity of mentioning it. I would also call the attention of architects and artists who desire to use oil paint in this way, to a very excellent material prepared by M. Binaut, of the Rue de Clery, at Paris. He makes canvasses larger than 20 ft. by 20 ft. in a single piece, on which the whole of a ceiling can be painted in the studio for subsequent application elsewhere. He sells it ready prepared for the painter's use, grounded in any graduated tints which may be required. It is a very handy material, and is light and of a nice surface. One word as to the peculiarity of the texture of canvas used for decorative purposes. The reason only rough canvas has so good an effect for mural painting in oil, is because it is in fact the only means by which the usual glitter of oil painting can be overcome, excepting, of course, by such an alteration of the vehicle by the admixture of turpentine, wax, or gum damma, as scarcely leaves the picture what is usually called an oil painting. If canvass, fine in texture, evenly grounded with a non-observant ground, smoothly pumiced down, be painted with colours

MURAL DECORATIONS AT SIR WALTER TREVELYAN'S, WALLINGTON.

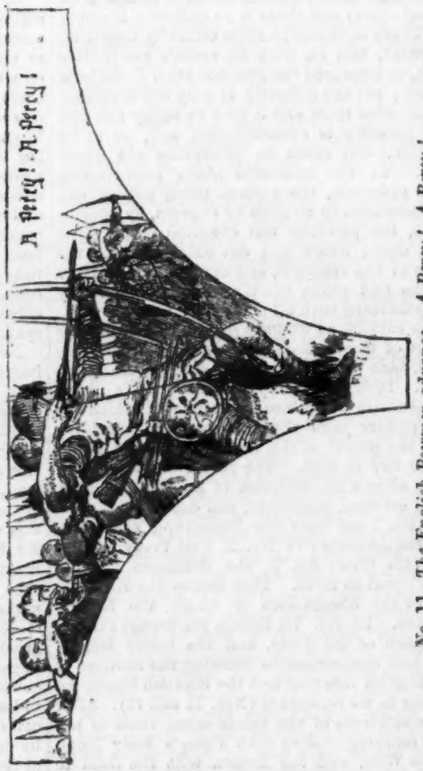


No. 7. *The Battue.—The Archers posted for Shooting.*

No. 12. *The Scottish Spearmen closing in.—A Douglas! A Douglas!*



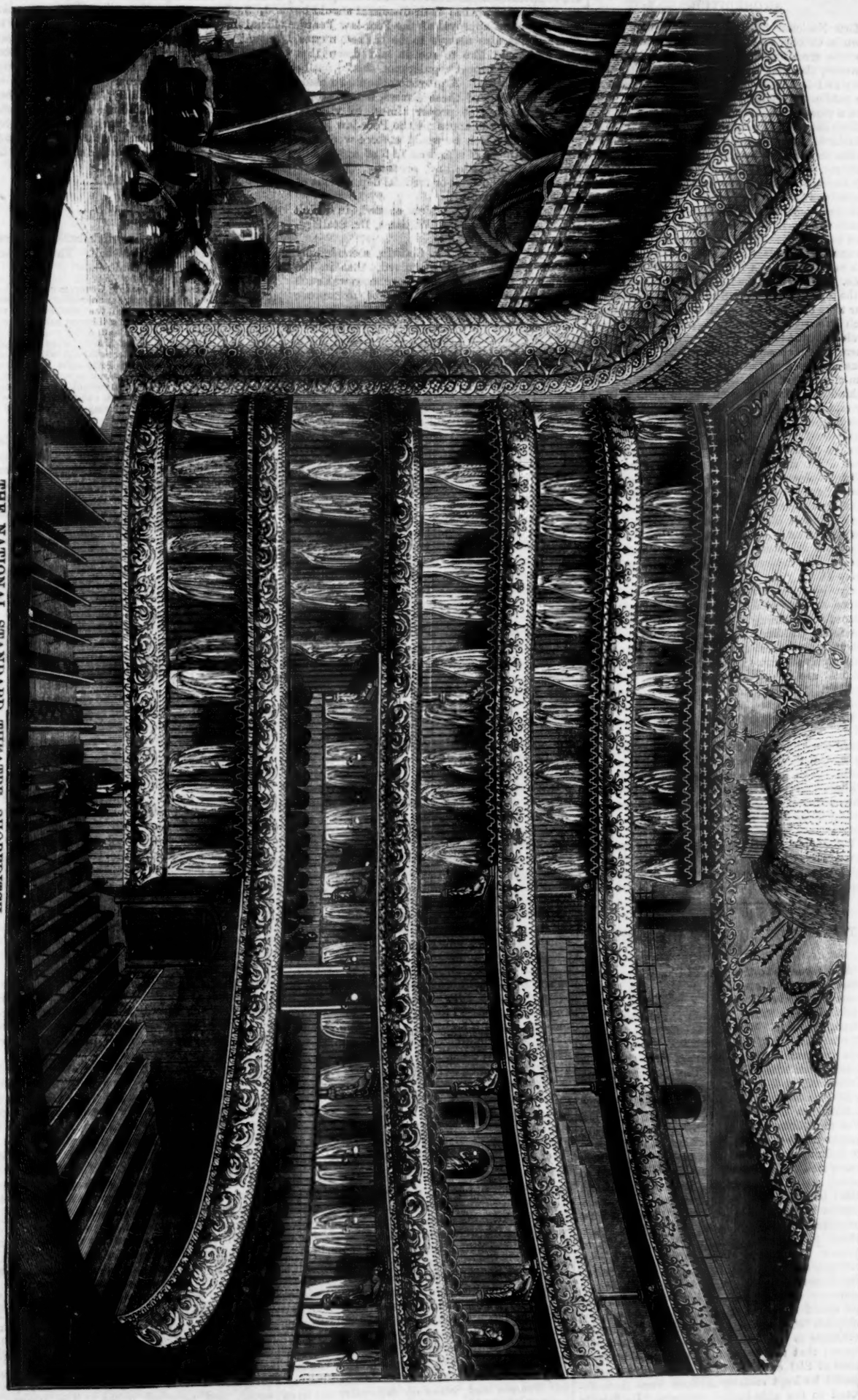
Section through Corridor.



No. 11. *The English Bowmen advance.—A Percy! A Percy!*

ground in oil, and with nut or linseed oil as a medium, the surface of the picture will be so flat, that when it reflects light it will reflect it as from a luminous sheet. With canvas in large granulation painted even with the same vehicle, light will be reflected from every minute elevation of the canvas in tiny scintillæ or pencils, but the corresponding depressions will be all in deep colour—*i.e.*, colour either in shade or in shadow. That is why oil paint applied upon a coarse canvas produces a better effect for mural decoration than it does when applied to a perfectly flat surface of fine canvas. The old Venetian paintings were usually executed upon canvas, the texture of which is quite obliterated by the heavy grounding, and much varnish has been used in the finishing; the consequence is that they glitter most disagreeably. The preparation used habitually by French and German historical painters, produces a dead or "mat" effect, partly by the nature of the preparation, usually a bastard-encaustic, and partly by the coarse granulation of the canvas upon which it is applied.

Mr. W. B. Scott said, I fancy we shall never take to fresco again in this country, unless it be on very carefully prepared interior walls, and after an apprenticeship on the part of the painter it might be tried with success. But I look upon it that the silica process has superseded it, and, apart from that, the introduction of oil pictures; canvas pictures, planted on walls, are almost the only chance of getting interior decorations well carried out. The danger and difficulty of getting the walls painted without having the works done in the studio, and applied to the walls, are so great that we are rather chary of it. The only difficulty, as it appears to me, in using canvas pictures, is in the matter of lighting. If they have no shine, the whole advantage of the canvas picture and oil painting is obtained. Oil painting stands the climate of England better than any other kind of painting; and if it has no shine it appears to me the best adapted to this description of decoration.



THE NATIONAL STANDARD THEATRE, SHOREDITCH.

THE NATIONAL STANDARD THEATRE, SHOREDITCH.

The National Standard Theatre was burnt down in October of last year, and for some time the site remained unoccupied. In July, 1867, however, the first stone of a new theatre was laid; and last week the building was opened to the public. It is large and lofty, and we now give a view of the interior, produced under some difficulties. The ground upon which the old Standard stood has been considerably enlarged for the new theatre by the purchase of adjoining property. The site was originally that of the old Curtain Theatre, one of the most ancient playhouses in the metropolis. This theatre is mentioned as early as 1578, in a sermon at St. Paul's Cross. Ben Jonson exhibited his abilities here both as an actor and an author. Upon this ground Mr. Douglass has erected his new theatre. The main building is 167 ft. in length and 90 ft. wide. The height of the interior, from the pit floor to the top of the dome, is 84 ft. Within this space four tiers of boxes and a gallery are constructed, each one receding from the other, the lowest circle being 54 ft. in width, the highest one 66 ft. There are no columns visible in the front of the house. The first tier is a balcony of cushioned arm-chairs, covered with crimson velvet. Behind is a circle of comfortable little private boxes, fitted and lighted in a convenient manner. The shape of the interior of the building is a horse-shoe. The theatre is to be lighted by a massive crystal sunlight, by Messrs. Defries & Sons. All the staircases are of stone. The gallery staircase and the two at the side of the proscenium are carried the whole height of the building. From the main entrance in Shoreditch a double flight of stone steps conducts to a spacious lobby, where they break off to communicate in separate flights with the several tiers. This lobby is surmounted by a dome, rising 40 ft. The box saloon is large. An iron bridge spans this room, forming the main entrance to the third tier of boxes. Above the saloon, and running nearly the whole length of the front building, is a spacious room, which will make a concert or billiard room. There are ninety private boxes in the theatre. The decorations are mostly of *papier mâché*, coloured and gilt. The stage at the proscenium is 44 ft. wide, and from the footlights to the back wall it is 70 ft., and to the front of the first horse-shoe 66 ft. To the barrel-loft the height is 94 ft.; hence the greater part of the stage working will be in the flies, the scenery consisting chiefly of cloths. The act-drop has been painted by Mr. William Telbin. It is partly shown in the view. The curtain is composed of crimson silk velvet, arranged in folds and embellished with golden fringe.

We may take another opportunity to speak of the merits or demerits of this new place of public resort when we have seen it filled with persons.

THE IMPROVEMENT OF WORKHOUSE INFIRMARIES.

At a meeting of the Health Committee of the Social Science Association on the 18th, an address was delivered by Mr. Ernest Hart, "On a national Scheme for the better Organization and Management of Workhouse Infirmaries." Mr. Edwin Chadwick, C.B., presided. The speaker said the number of workhouses throughout the country, excluding those in the metropolis, was about 600, and within these there were about 40,000 acutely sick people; and these were not confined to a few houses, but were scattered over the whole number. Now at present there was no medical authority at the Poor-law Board to technically deal with these persons. There was a medical officer at the Poor-law Board so called, really a district inspector with a double title; but the real work was done by certain district inspectors, who, in fact, possessed no technical knowledge upon the subject upon which they were called to report. Each inspector had about fifty workhouses on an average, and his duty consisted in inspecting the houses about twice a year. Giving a summary of the heads of his general scheme, he would say that it should first include the adoption of a series of general principles in reference to the infirmary portion of the workhouse; that the space for sick should be regulated at 850 cubic feet; and that these wards should be kept entirely distinct from those devoted to the able-bodied paupers. He further suggested that the medical officers should have a life appointment, and should be more adequately remunerated, and that their dismissal should be subject to the approval of the Poor-law Board. There ought also always to be trained nurses, and he should like to see it laid down that visitors, under proper regulations, should not be liable to exclusion. A provision should be made for the opening of these houses, under proper regulations and at proper times, to visitors. The two great changes in the Poor-law Board and its staff which he would enforce were first the appointment of a limited staff of technically educated inspectors; and, secondly, the establishment of a hospital or medical department at the Poor-law Board.

An interesting discussion ensued, in which the chairman, Mr. Hugh Williams, Dr. Stallard, and others, took part.

On the motion of Mr. Godwin, seconded by Mr. B. Baker, it was resolved, that in the opinion of the department the scheme was such as would in its broad features tend to improve the management of the country workhouse infirmaries, and that it be referred to the council to lay it before the Poor-law Board, and request their best consideration for the same.

THE O'CONNELL NATIONAL MONUMENT.

The sketch-model for this work, by Mr. Foley, R.A., has just been exhibited in Dublin, where its unique beauty at once secured for it the unanimous approval of the committee and the public. The design comprises a *base*, supporting four winged victories of Patriotism, Fidelity, Courage, and Eloquence, as typical of the qualities of mind exhibited in the labours of O'Connell; a *pedestal*, enriched by groups of figures of all classes, assembled to hear Erin's proclamation of their newly-acquired liberties; and a *statue* of O'Connell surmounting the whole. The cost of the finished work, which will be executed in bronze and granite, and above 40 ft. in height, is anticipated to exceed 10,000*l*.

THE LIVERPOOL FREE PUBLIC LIBRARIES.

The 15th report, for 1866-7, of the committee on the Liverpool Public Free Library, Museum, and Gallery of Arts, has been presented to the town council and printed. It shows that the number of books issued in the reference libraries for the past year, has been 578,774; and in the lending libraries, 420,282; in all 999,056, or in round numbers, a million of volumes of healthy literature have been distributed amongst the working and middle classes of Liverpool during the past year! We believe this issue is unprecedented in any library in any country, and it must hold an important position in relation to the question of general education now so much talked of. So with the Manchester libraries, which, however, *only* issued 600,000 volumes during the same period. The Liverpool report states that the erection of the Gallery of Arts is now in a fair way of being proceeded with; that the property required for the site has been scheduled under an Act passed during the last session; and that the borough architect is preparing plans for the intended building. The main feature of the year, besides the astounding issue of books, had been the acquisition of the magnificent collection of historical art treasures given to the town by Mr. Joseph Mayer, F.S.A.

LOCAL MUSEUMS IN INDIA.

The demand for local museums of industry and fine arts which is now so active throughout Europe has extended to India. The Governor-General, as we said some time ago, has appointed a commission to report on the conservation of the ancient architecture of India, and the best means of obtaining casts of the finest examples.

The Lieutenant-Governor of the North-West Provinces has also organized a committee of action for his district, and has laid down the principle that a museum should be established at the head-quarters of each revenue division, and that the chief museum for the North-Western Provinces should be at the seat of Government. Collections of diagrams and drawings illustrating frescoes and works on decorative art have been ordered to be sent from England.

The main objects of local museums are defined to be:—1. The improvement of manufactures; and, 2. The preservation of modern art. An official memorandum states that, "in order to prevent natives from thinking that European designs were desirable as copies for ornamentation, it would be necessary to procure many modes of illustration from different parts of India and the East generally," and that it is not in the modern art manufacture of India that the means can be found to give new life to the native designer. It is in the architecture of the country that purer and more original ideas can be found.

SCHOOLS OF ART.

The Reading School.—The distribution of prizes has taken place in the town-hall. The audience was small. The report said:—

"The committee of the Reading Government School of Art, in presenting their seventh annual report, have much pleasure in being able to record the prosperity of the school, which, from its foundation till now, has continued steadily to increase. The examination this year was held on the 12th, 13th, and 14th of March, when 73 pupils attended. Of these 37 were successful—10 taking prizes, the remainder cards of merit. Fifty-eight works were sent to South Kensington for national competition, six of which were selected. One national medallion was awarded, and 10 third-grade prizes. The total number of pupils who have attended has been 107, showing an increase of 11 over the previous year."

Mr. Havell said that there were only 80 medallions circulated throughout the country, and therefore they had a fair share in receiving one; and the local prizes were supplemental to the prizes given by Government, and were purchased by the committee from the prize fund. He had always considered that the instruction in elementary schools was of great importance. Previous to 1865, the management of the grants given by Government was entrusted to the art-master, who received a slight pecuniary advantage. In 1865, the number of pupils under instruction at Reading and the branch school at Henley, was 838; but during that year a new minute was issued, and the management was taken out of the hands of the art-master and placed in the hands of managers of schools. He questioned at the time whether the course was a wise one, and the result had shown that it was not. One manager objected because a subscriber did not approve of the new-fangled notion, and another could not afford it. To meet this latter objection he (Mr. Havell) gave instruction for nothing, and then they said that they could not purchase the materials, and he supplied the materials for nothing,—and then they accepted. The number of pupils now was 152, against 838 in 1865. Mr. Lefevre distributed the prizes.

The Southampton School.—In pursuance of resolutions adopted by the borough council, in which they accepted an offer made by the committee of the School of Art, to transfer that school to the council, that it might be carried on as a branch of the Hartley Institution, the Hartley council have had under their consideration certain regulations for the management of the school, and for the specification of the duties of the master, which they recommend the borough council to adopt. The Hartley council have received from Mr. W. J. Baker, the present master of the school, a statement of his concurrence in these rules, and of his willingness to hold the office of master in conformity with them.

The Stourbridge School.—The annual meeting of this institution has been held in the school-hall. There was a tolerably good attendance. The Hon. C. G. Lyttelton presided. The report stated that there was again an increase in the number of those attending the school, and for the last ten years an increase had been steadily maintained. In the study of colour there was a marked improvement, and, as the effect of colour was gradually being more considered in works in glass, it was hoped the result would be that to the superiority of manufacture for which English glassmakers had always been famed would be added a reputation for colour, in which, hitherto, Continental glassmakers had surpassed them. Of the students examined, twenty-six had passed satisfactorily in the second or higher grade; six passed, and their papers were marked "excellent;" six received prizes; and two received full certificates of having passed in every subject in the second grade. Fifteen out of the thirty works submitted for national competition were passed as satisfactorily executed, and awarded prizes. The income of the school had been sufficient to meet the

expenditure. It was hoped the Government would give assistance in regard to securing the building in perpetuity for the use of the school, provided a sum of 400*l.* could be subscribed. A report was also read from the master of the school (Mr. Bowen) touching the progress of the students during the year, and other matters connected with the interests of the school.

The Bradford School.—The annual public meeting and distribution of prizes in connexion with this school took place in the High School, Hallfield-road. The admission was by ticket, and the number of persons present was rather larger than the room could comfortably accommodate. The walls were hung with the art-productions of the pupils. Alderman Godwin, the chairman of the Committee of the School of Art, presided. The chairman said, that in all respects, the school seemed to be in a healthy condition, and had in it some principle of vitality which seemed to ensure success. One passage in the report made reference to technical education. The annual report stated that during the past year the progress of the school, though not very rapid, has been satisfactory. There are now 89 students on the books—75 evening class and 14 ladies' class—against 78 in 1866, 61 evening class and 17 ladies' class. Mr. Forster, M.P., addressed the meeting, chiefly on the subject of technical education.

The Lincoln School.—The distribution of prizes to students in connexion with the Art Treasures Exhibition which has been open during the past month in Lincoln, took place in the School of Art, in which the exhibition had been held. There was a numerous attendance. The mayor occupied the chair. The report of the school committee announced the steady success of the school. The position it attained in the first year of its existence was such as to astonish all connected with such institutions, but this success had been improved upon every year, the last competition being very satisfactory.

ANNUAL MEETING OF THE INSTITUTION OF CIVIL ENGINEERS.

IN the report read at the meeting held on the 17th of December, Mr. Fowler in the chair, it was stated that many circumstances beyond the control of the council had prevented a satisfactory conclusion being arrived at as to the plans that ought to be adopted for providing additional accommodation for carrying on the business of the Institution.

The establishment of a class of students, to be attached to the Institution, but not to form part of the corporation, in lieu of the old class of graduates, was touched upon; and the mode of admission to and the privileges to be enjoyed by this new class, as set forth in the by-laws adopted at a general meeting of members in June last, were detailed. Although not specifically mentioned in the rules, it was contemplated to organize supplemental meetings for the reading and discussion of papers by the students, and possibly, also, for the delivery to them of lectures upon special subjects.

During the past session 48 members and 79 associates had been elected, while the deceases, resignations, and erasures, together amounted to 38; leaving an effective increase of 94, or at the rate of 7·02 per cent. on the present number of members of all classes. There were on the books on the 30th of November last, 18 honorary members, 589 members, and 826 associates, making a total of 1,433, exclusive of students.

"With respect to the sources of income, and the way that income has been disbursed, a brief summary of the statement of receipts and expenditure for the year ending the 30th November, 1867, showed that the subscriptions and fees (exclusive of the Building Fund fees) had amounted to 4,513*l.* 6s. 6d., the interest on investments on the general account to 488*l.* 5s. 8d., and the miscellaneous receipts to 548*l.* 7s. 4d., making together 5,546*l.* 19s. 6d.; while the Building Fund fees and dividends had realised 844*l.* 1s. 7d., and the Trust Funds 371*l.* 15s. 5d., bringing up the gross receipts to 6,761*l.* 16s. 6d. In the same period the disbursements, including the payments on account of the arrears of the minutes of proceedings, had been 4,850*l.* 8s. 8d., and for premiums under trust 163*l.* 10s. 8d.; while there had been invested on different accounts a sum of 1,638*l.* 1s. 3d. in the purchase of Reduced Three per Cent. Annuities. The cash balances exceeded by 109*l.* 16s. 4d. the sums in hand at the same date last year, making up the difference between the two sides of the account, as presented in the foregoing analysis."

The following gentlemen were elected to fill the several offices on the council for the ensuing year:—Charles Hutton Gregory, president; Joseph Cubitt, Thomas Elliot Harrison, Thomas Hawksley, and Charles Vignoles, vice-presidents; James Abernethy, William Henry Barlow, John Frederic Bateman, Joseph William Bazalgette, Nathaniel Beardmore, Frederick Joseph Bramwell, James Brunlees, George Willoughby Hemans, John Murray, and George Robert Stephenson, members; and John Horatio Lloyd and Captain Henry Whatley Tyler, associates.

THE EXPLORATIONS AT JERUSALEM.

CAMBRIDGE ARCHITECTURAL SOCIETY.

AT the third meeting of the Cambridge Architectural Society for the Michaelmas term, the chairman called on the Rev. T. G. Bonney for his communication on "The recent excavations made by the Palestine Exploration Society at Jerusalem."

Mr. Bonney, after a few words of introduction, said the authors who had written upon the position of the ancient Temple enclosure at Jerusalem might be divided into two classes;—those who considered it to occupy a square of about 606 ft. in the south-west angle of the present Haram: and those who supposed it, with the fortress Antonia, to extend over the whole of the Haram. One of the most prominent defenders of the former theory was Mr. Fergusson, who, in addition, had started the notion that the Dome of the Rock was the church which Constantine was by him imagined to have built over the Holy Sepulchre. For this there was not a tittle of evidence. The excavations made at the south-east angle had proved that undisturbed masonry of the age of Herod the Great could be traced down to the rock, about 55 ft. below the present level of the ground. They had also traced the wall of Ophel from its junction with the Haram wall, to a distance of about 300 ft. south-south-west, and had found a passage running for about the same distance under the Haram area. They had also traced the same masonry down to the rock at the south-west angle to a depth of 95 ft., and had discovered that a deep ravine, some 40 ft. wide, skirted the Haram wall on the west. This was formerly spanned by the arch known as Robinson's Bridge; and further excavations in the Tyropœon valley had discovered traces of a colonnade which had apparently formed part of an approach to it. The question, therefore, of the extent of the temple area was now settled in favour of those who had supported the second theory.

Mr. Williams said, as to the discoveries made by Lieutenant Warren about the Temple area, he confessed that he did not attach so much importance to them as others had done, because he never could feel the force of the arguments by which it had been attempted to place the Temple area in the south-west angle of the present Haram enclosure. From the fact that Mr. Fergusson, Mr. Thrupp, and Mr. Lewin had all adopted this theory, he saw that there must be strong arguments in favour of it; but he had never been able to accept them, because it seemed so clear to him that such a situation was directly opposed to the testimony of Josephus, who certainly represented the Temple as occupying the summit of the hill; whereas this modern theory would hang it on the hill side, which would be an impossible position for a fortress—such as we know the Temple was—commanded as it would have been by the raised platform on which the Dome of the Rock now stood. It had, indeed, been proposed by some authors to place the fortress Antonia on that raised platform; but that again was directly opposed to the testimony of Josephus, who placed the Antonia at the north-west, not the north-east, angle of the Temple area. The chief satisfaction which he derived from these discoveries was this, that they served to vindicate Josephus from the charge of exaggeration, so often unjustly brought against him. His description of the view from the top of the walls at the extremity of Herod's cloister, along the south of the Temple area, had been ridiculed as absurd, but was now found by these recent excavations to be nothing more than sober truth. Mr. Williams acknowledged that he had been obliged to modify his views of the southern limit of the Temple area. All that met the eye in the substructures along the south wall, in the vaults at the south-west angle, in the double and triple gateways, belonged clearly to a late Roman period, and he had accordingly assigned to them the date of Justinian, who had built a church of St. Mary on the present site of the Mosket-Aksa, and in connexion with it a large hospital for the sick and a hospice for pilgrims. He was now convinced that the Haram enclosure was identical with that of Herod's Temple; unless indeed the recent discovery of a fosse cut in the rock a little to the north of the raised platform, not yet fully described, should require us to modify our views still further. Mr. Williams, in speaking of the Church of the Holy Sepulchre, adduced some further proofs of the identity of its site with that on which Constantine had erected the Martyry of the Resurrection, which was a question altogether distinct from the authenticity of the site itself. He then described the discovery of the northern and southern apses of the rotunda of the church, which he believed to be such *exedræ* as are described by Eusebius, in the cloister that surrounded the open court to the west of the Basilica, in the centre of which court the Sepulchre itself stood. These two apsidal recesses had been strangely omitted in Captain Warren's plan of the church, published by the Ordnance Office, although they had been inserted in earlier plans, as *e.g.* in that of Mr. Scoles, published by Professor Willis, in the second edition of Mr. Williams's "Holy City." These two apses he had again identified last year, and had made a discovery in the southern one which he considered to be of great interest and importance, as identifying the actual site with the ancient one. He exhibited a drawing of an ancient tesselated pavement, which he had found on the floor of this apse, and which he believed to belong to the original court of Constantine's Church, as he could assign no later date to its execution. He had submitted it to a friend of his in the South Kensington Museum, who had obtained the opinion of men learned in such matters there and at the British Museum, and the result of these inquiries was, that it might very well be a pavement of the Constantinian era, executed by local workmen. In conclusion, he thought that, as the theory of the cave under the Dome of the Rock being the true Holy Sepulchre had been entirely exploded by recent discoveries, and the identity of the Saracenic Mosque with Constantine's Church of the Holy Sepulchre had been disproved, all would be glad to acquiesce in the old conclusion that the present Church of the Sepulchre stands in the same position in which Constantine originally placed it.

METROPOLITAN BOARD OF WORKS.

THE report of this Board for 1866-7 has been issued. The subjects of which it treats have already been mostly noticed in our columns as they came before the Board at their various meetings. The main drainage of the metropolis of course occupies a considerable share of the report. There are also reports of the Thames Embankment and other metropolitan improvements, utilization of the sewage, the gas question, removal of Middle-row, Holborn; open spaces, parks, &c.

The results of the sewage-utilization experiments by the company to whom the concession of the northern sewage was granted are considered to be most satisfactory. The crops raised from land manured with the sewage have exceeded the most sanguine expectations. The principal crop grown, as our readers know, is Italian rye grass; and it is stated that, on one place which was sown in August, 1866, and which has received about 4,000 tons of sewage per acre, the crops were as follow:—Eight tons per acre early in April, ten tons in the middle of May, and about twelve tons in the week ending the 22nd of June. On other pieces the crops were even heavier. It also appears that great success has attended the growth of mangolds, potatoes, flax, lucerne, cabbage, celery, and strawberries. The most promising experiment, however, was the wheat crop, on which the sewage was poured four times during the early growth of the crops.

The removal of Middle-row, Holborn, was estimated to cost 61,152*l.*, but it has been effected below that amount. The claims up to 31st March last were 52,006*l.*, whilst the settlements amounted to 43,398*l.*

The widening of Park-lane will be done by setting back the Park boundary fence, at a cost of between 3,000*l.* and 4,000*l.*

As to the gas supply, the report adverts at great length to the exertions in Parliament to obtain for the public a cheap and pure supply of gas; but they had not been successful.

The total receipts of the Board in 1866-67 were 3,148,112*l.* 7s. 3d., and the total payments 3,090,045*l.* 1s.

After mentioning other topics of minor im-

portance, the report concludes :—"Foremost amongst the improvements effected by the Board must ever be considered the main-drainage system, the beneficial results of which are evidenced by the improvement in the general health of the metropolis, and especially in that of the low-lying districts." It calls attention to the improved condition of the Thames, the formation of new broad thoroughfares, the embankment of the river, and the formation of parks for the people; and mentions that means are urgently required for making other improvements which are greatly needed, and suggests that these means should be raised by a tax levied on the owners of property.

A PROPOSED CANAL.

An Act is to be applied for in the ensuing session of Parliament, by some of the landowners and others interested, for powers to construct a canal from the River Thames at Wandsworth along the valley of the River Wandle to Wimbledon. The embankment of the Thames has so reduced the wharfage space along the river above Blackfriars Bridge that extra accommodation is said to be eagerly sought after.

The Wandle valley is teeming with paper mills and other manufactories, which at present are without the facility of either railway or canal accommodation. The probable cost of the proposed undertaking, as estimated by the engineer, Mr. Hamilton Fulton, amounts to the sum of 120,000*l*. The proposed undertaking comprises also a roadway, tramway, and sewer. The tramway would give, at small cost, a connexion between the Brighton and South-Western Railway systems and the proposed canal. The Wimbledon and Merton drainage is greatly defective as regards the outfall, and it is believed the construction of the proposed sewer would afford efficiently the desired facility to these low-lying districts, and also to the houses and factories bordering on the River Wandle. It is intended to purchase a certain depth of land along the site of the proposed road, and after the road is constructed to sell off the land at an enhanced price in building plots.

CIVIL ENGINEERS IN INDIA.

Sir,—I inclose an extract from a recent Government of India Gazette, which makes public property of matter that was circulated by itself throughout the Public Works Department a short time ago.

That you may see at a glance what is the actual difference in the scale of pay, I append to the extract a list of those grades in which a difference subsists.

In the Covenanted Civil Service of India, entered by competition and open to all, no attempt is made to arrange salaries, or, rather, to lower them down to the level of native candidates. If a native can enter, he gets the same pay as his European *confrères*. It is not at all surprising that the difficulty felt by Government did not "occur" to the commissioners. They would never guess that civil engineers sent out from England were underpaid because native candidates were usually wanting in strength of character. The commissioners are men of practical Indian experience, and know what a farce it is inviting native young men on the present system to join the upper engineer service.

If you will consult the classified list of the Public Works Department, you will see there are only two or three native engineers in the whole of it, though they have had the higher branch of service open to them for the past ten years or more.

In Madras, not very long ago, the authorities declared they had no institution capable of affording the advanced education necessary to enable natives to enter the Public Works Department as assistant engineers. They might have added, with truth, that there were no youths of sufficient social standing likely to come forward. The natives of Madras are not nearly so wealthy, nor, in many respects, so civilized, as those of Bengal.

In Bombay there is only one native executive engineer; and, as there all the cleverest natives can make large fortunes in trade, candidates are not likely to come forward very freely.

The natives who come to Indian colleges are not, as a rule, of the best families. These at heart despise British institutions; but poor Brahmins, sons of clerks, and inferior *employés* in Government offices, and those who feel that, to get a living, they must conform to European modes, repair to them. Further, the educational institutions are not widely spread, and draw their students from the large Presidency and other towns. If they knew they were to be employed as engineers in their own neighbourhoods, perhaps good men would be eager to go into the service; but none but those induced to do so by sheer stress of circumstances, will care to be liable to be moved from Burmah to Hyderabad or Central India, or even to distant places in their native province.

Further, there are physical peculiarities in natives of India which cannot be ignored. Generally speaking, those highly intelligent young men the Government allude to as able to pass the highest theoretical tests are of exceedingly delicate make. It is not so much strength of character as strength of body that they want. On the other hand, the natives of swarthy build, and of whose warlike prowess we so often hear, have little or no headpiece at all. For some reason or other sedentary occupations, particularly those which call for great and sustained intellectual labour, are in India very weakening to the European constitution, especially to a robust constitution. And so it will be found that those classes of natives who have set themselves aside for sedentary pursuits are not strong enough to do much out-of-door engineering work, or the effort is such a tax upon them as to prevent success.

This evil of weakness is not so apparent in the natives who are employed as subordinates. They are tolerably active, and decently intelligent as well; but their qualities are not of the highest order, and their social standing is similar to that of such parties in England.

Natives of good family, who combine ordinary talent with personal energy, and who would turn out promising engineers, are very rare. If such go into the public service, they choose the revenue or judicial branches, which are much thought of, well paid, and which, it must be said, present numerous opportunities of illicit aggrandizement, which cannot be said of the Public Works Department, with its numerous checks.

If at the beginning of this century the Company's civil servants took bribes and presents freely till their pay was raised, and no less an authority than Sir Thomas Munro gave it as his deliberate opinion that they would always do so if their salaries were below a fair rate (see Gleig's "Life of Munro"), it is improbable that native Government agents would now be found proof against the temptations which are enormous in the courts and cutcherries.

Natives, in addition to observing no opportunities of augmenting their salaries by left-handed means, see the repute in which the Public Works Department is held. Most people make a laughing-stock of it. Even the engineers in it occasionally join, so absurd is the mass of routine they have to maintain. Besides, they notice that, as the Government say, the pay is just the same as other staff employ which calls for nothing like the same theoretical knowledge. It is also a department all through paid one-half as well as the civil service, and only entered by staff corps officers who have insufficient influence to secure a more dignified and comfortable situation.

The fabric has hitherto, in fact, only been kept together by the East India Company's military engineers, who took great pride in Indian public works, and lost sight of material advantage in the engrossing details of their duty. It even escaped them to notice how easily officers from the infantry were put into many of their good appointments. But as a body they were poorly paid and slowly promoted. The Indian engineers are now left to gradual extinction,—vacancies are not filled up, and Royal Engineers who care to come out can claim withdrawal at the end of seven years. As at the end of seven years an officer can hardly expect to be more than executive engineer (fourth grade), he will be only 10*l*. a month the richer in salary than when he first came out; and, having had a disagreeable time of it in a rough, uncivilized country, will be glad to be quit of it and of the Public Works Department for the remainder of his period of service.

Nothing can render India popular but high pay and liberal furlough rules. The maxim hitherto has been the lowest possible pay and to allow no one to leave the country unless he is sick.

During the last few years the price of provisions has advanced from 50 to 150 per cent. This is probably due to the heavy cash expenditure upon railways and cotton, and corresponding neglect of irrigation and agriculture. Salaries keep to their old level notwithstanding the depreciated currency.

A visit to Europe is, on the score of health alone, desirable after five or at most seven years' residence. The Government do all they can to hinder leave being taken even after ten years. They know their service is underpaid, and, perhaps, fear lest many should quit in disgust upon revisiting their native country too early.

Higher pay could be readily afforded if Government were to employ fewer engineers and give them larger powers. As it is, a highly scientific officer cannot buy a set of tools or plant, costing say one-third of his own pay, without referring to some superior, and pointing out minutely the necessity for the article. If whitewashing a room costs 5s., when it has been estimated at 3s. 6d., he has to afford lengthy explanations—that the walls were smoked and had to be sized, or that he used glue instead of rice water, or the like—in a letter that takes an hour to write may be. And, after all, he is informed that this wasteful expenditure cannot be allowed in future.

Again, nothing is commoner than for a superintending engineer to order an executive engineer, 4th grade, to prepare plans and estimates for difficult and costly works really beyond his powers and experience. He wastes a deal of time and thought over them, sends in the best sort of project he can, after reminder and reminder from the superintendent engineer that he is waiting for what, under a proper system, he, as a well-paid experienced officer, should have drawn up himself. The project is found, of course, deficient in many points, scored over with pencil-marks, and returned, with caustic reflections on the young executive's want of skill.

The waste of engineering ability in India, through the distrust there is of everybody as to fitness, and we might almost say integrity, is only second to the money wasted in badly-performed work and the keeping up of a complicated system of accounts suitable only to barrack construction and to a highly civilized country.

You will do the profession great service by bringing forward such considerations as those I have lightly touched upon, but I am afraid nothing short of a Parliamentary inquiry will put things on a decidedly better footing. At present it is almost a mockery on the part of the authorities styling an engineer a "professional man," since he is not trusted or treated as such.

A former Correspondent.

In the supplement to the official *Gazette* of India, dated October 12, 1867, appear the following remarks on the recommendations of the Commissioners on the famine of 1866, in Bengal and Orissa:—

III. Irrigation generally.

A reconsideration of the system under which civil engineers are got out from England for service in India, is recommended in paragraph 58, page 168. The commission was evidently not aware of the very full consideration this subject has already received from the Government of India, nor of the difficulties with which it is beset.

The commission notice that, even after the changes made in 1865, there is still a difference between the salaries of civil and military engineers in the lower grades, and recommend a higher standard of examination and higher rates of pay for the successful candidates for employment as civil engineers.

It does not seem to have occurred to the committee that the difficulty of arranging the matter of salaries arises out of the difference between European candidates for employment in the department, and those who are natives of India, and to whom this line of employment is equally open. The latter will often pass easily the highest test in theoretical examinations, and yet prove useless as engineers from want of practical energy and strength of character. With the former, these last are so seldom found entirely wanting, that the examination tests alone are almost sufficient to ensure the requisite qualifications. It has always been considered impossible to make a distinction between Europeans and natives in the tests to be laid down for admission into the service as civil engineers. This being so, the scale of qualifications and pay cannot be fixed, as if all the candidates were sure to be Europeans. There are no means of testing practical energy and strength of character, except by putting the person to actual work or business. Thus, in order to eliminate a number of unqualified native young men, without driving away such as are qualified, it is necessary to admit civil engineers, who enter on theoretical examinations only, at a low scale of pay, and to let them advance by promotion as soon as they are found to possess the other necessary qualifications. The only alternative is to insist on some length of approved professional experience as civil engineers, and to admit the candidates so qualified in higher grades of assistant engineer. This is done to some extent.

With Royal Engineer and Staff Corps officers there are no such difficulties. Their college and military service, before they enter the Public Works Department, suffice to

make known to some degree their capacity for business and their character, so that they can be admitted at once at a rate of pay that could not be offered to a native candidate of untested powers in these respects; while, at the same time, other departments of the staff and civil employ, which do not require such severe theoretical tests, are open to Staff Corps officers at pay as good as that of the Public Works Department. These are the reasons why the pay of military engineers cannot be lower, nor that of civil engineers higher, in the lower grades of the service. The discrepancy is, however, greater apparently than actually, because the number in the lowest grade where the difference is greatest, is small.

ENGINEERS.	Maximum Monthly Salary.		Difference.
	Military Officers.	Civil Officers.	
	Rupees.	Rupees.	Rupees.
Chief, 3rd class	1,850	1,750	100
Superintending, 1st grade	1,800	1,600	200
,, 2nd grade	1,650	1,400	250
,, 2nd class, 1st grade	1,550	1,200	350
Superintending, 2nd class, 2nd grade	1,350	1,000	350
Executive, 1st grade	1,250	900	350
,, 2nd grade	900	750	150
,, 3rd grade	750	600	150
,, 4th grade	600	500	100
Assistant, 1st grade	500	400	100
,, 2nd grade	450	300	150
,, 3rd grade	450	200	250

SOUND IN HER MAJESTY'S THEATRE.

I VENTURE to ask space for a few lines relative to a subject to which the appropriation of the building lately destroyed by fire to musical performances of the highest class lends an exceptionally great importance, but which has escaped notice in the correspondence published relative to the building, so far as I have seen it.

In almost all the "obituaries," as one may call them, of Her Majesty's Theatre, which have recently appeared, some such statement as this occurs,—"The acoustic qualities of this building were unequalled in Europe." This, no doubt, was strictly true. Music, both orchestral and instrumental, sounded more brilliant in tone and was more uniformly well heard in that house than elsewhere; and artists are understood to have used their voices and instruments there, notwithstanding its vast size, with greater ease and comfort than elsewhere. But to this statement has been added, in more than one quarter, that these qualities were the result of accident rather than design; so that it is to be feared the building, when rebuilt, may not possess them. This representation I venture to call in question.

The mere fact of a building designed for musical performances proving suited to them, goes far towards proving that the success was due to design; and I venture to address you in the hope that, whenever this Opera House comes to be rebuilt, perfect suitability to musical performances may not be overlooked as one of the essential requirements of the structure; for I maintain that, by using the same means which Novosielski used seventy years ago, *the same results may be again attained.*

The acoustic qualities of Her Majesty's Theatre were due partly to the forms and proportions adopted, partly, perhaps, to the existence of certain cavities, and very largely to the material employed.

Without going into any analysis here of the mode in which the shape of the building was adapted for the successful transmission of sound (some such analysis will be found in the volume on Acoustics in Weale's elementary series), it may be sufficient to say, that as the forms and dimensions are capable of being reproduced in a new house exactly, whatever was due to them may, of course, be in that way recovered. I am, however, of opinion that considerable variation, if desired, might be introduced in parts of the house, without at all lessening its perfection as an auditorium.

But it is the fact that all the interior faces of the building—those against which the vibrating mass of air impinged—were of resonant material, *i. e.* of dry wood in as long lengths as possible and fixed at as few points as possible, that the very remarkable acoustic qualities of the old house were mainly due. Nor is there, so far as I am aware, any possibility of securing this advantage with incombustible materials.

If it were at all feasible so to construct a theatre that nothing in it could by any possibility burn, it might be a question whether the attempt ought not to be made, regardless of the risk of having a "dummy" quality of sound as one result but things being as they are, I trust that precautions against those fires which can never be wholly guarded against will not be carried so far in the reconstructed house as to rob it of this, which was perhaps the most remarkable and, to a lover of music, delightful property of the old one. Let the surrounding corridors, the backs, and even the floors and ceilings, of the boxes, and the very floor of the pit, be as fireproof in their construction as we know how to make them. Above all, let *very numerous*, spacious, and thoroughly safe fire-proof staircases be provided; but let the inner shell of the auditorium, *i. e.* the ceiling and the box fronts, be constructed as they were before, or the loss by the fire will be, to the musical public, virtually irreparable, however splendid or however convenient the house may ultimately prove to be when rebuilt.

T. R. S.

NOTE FROM YORK.

A CORRESPONDENT writes,—The old George Inn, Coney-street, is now being pulled down. This inn was formerly the place in which was held a Guild of St. George (about the year 1,500), which was, I believe, for commercial purposes. It was afterwards the town house of the Duke of Buckingham, of the time of King Charles II. A very beautiful room in this old inn, called the "Apollo," and in which Francis Drake, the antiquary, who wrote the "History and Antiquities of York," used sometimes to take his sojourn, had the arms of King Charles II. and the Duke of Buckingham, in painted glass of the period. This room is engraved in the Abbotsford edition of the "Waverley Novels," in which the Duke of Buckingham is mentioned. The Duke of Buckingham had a house in Skeldergate, in the city of York, where he practised chemistry; on the site of this house is now a street, called after him, Buckingham-street. His estate at Helmesley, to which Pope alludes, was sold:—

"And thou, proud Helmesley, Buckingham's delight,
Sold to a scrivener and a city knight."

This scrivener was Duncombe, banker to King James II., who, when James applied for his money to him from St. Germain's, replied, he might come and get it. The beautiful Gothic doorway of this old building, with the "Pelican in her Piety," and other carvings, engraved by Halfpenny in his "Remains of Old York," is bought by Mr. Gutch, a gentleman living in the neighbourhood of the city.

THE CONDITION OF ARCHITECTURAL SCULPTURE.

I FIND in the *Builder* of December 21st a communication, signed "R. F. H.," referring to a letter of mine published in your number dated December 14th.

I beg to quote one paragraph from it: with the tenets promulgated in the latter part of that letter, it will be seen, in the position I have taken up, I have nothing whatever to do. I will quote the writer *verbatim*:—

"I have just read in the current number of the *Builder* the letter headed 'The Condition of Architectural Sculpture,' and signed 'John Roddis, carver.' It is admirable so far as it goes; but Mr. Roddis has altogether overlooked the most material bar to excellency in workmanship in England, which is trade-unionism, *alias* trade-terrorism. Did the proprietors of houses being built, did building committees, did architects ordain that one scale of wages should be paid in building trades to skilled and unskilled workmen alike? No; *but the men did.* Suppose an architect or his clerk of the works engaged a few first-rate hands and paid them whatever remuneration they chose to ask: what would ensue? *Rattening.*"

These italics are not mine. In answer to this, I beg to state that such a thing as an equalised scale of remuneration has never been recognized among us; and further, I may add, that no society has ever been formed by architectural sculptors to attain so undesirable an end, for the simple reason that we do not allow that nature has organised a certain standard of talent which cannot and must not be exceeded. In the letter referred to by "R. F. H.," I stated that there were "architectural sculptors to be obtained for 8d. per hour, and others who could not be obtained for three times that amount." This in itself should have been sufficient to show that they rate their value simply by ability, and not by number; and I think I may venture to say the same of every other branch of art-workmen. "R. F. H." asks, "Suppose an architect or his clerk of works engaged a few first-rate hands, and paid them whatever remuneration they chose to ask, what would ensue? Rattening!" That I deny. He should have blotted out that word, and written *excellence*, while writing upon architectural sculpture. That is the very thing we crave,—time for study. A remuneration that will pay, not for physical labour alone, but for a little thinking also. Your correspondent has mixed up the mechanical trades with those essentially artistic. How far those trades benefit themselves by banding together like so many vast human machines, striking down all the talent nature may have distributed among them into one mediocre level, is a problem time is fast solving for them. I feel what I consider to be the errors of such a system as keenly as "R. F. H.," and I am under the impression that I have endeavoured to show that what we mainly complain of is this system of *levelling* having been imposed upon us by the architects: rating all men alike, giving art-work a quoted price in the market, like so many yards of concrete, or so many tons of pig-iron. I reiterate here what I have said before, that English art-workmanship has been tried in Paris and found wanting, and I hold that this system is mainly to blame for it. The *Builder* of last week, reports Mr. Gambier Parry to have said at the Gloucester School of Art, "In all our highest manufactures, in which art appears, the French have outdone us completely." These are the words of a gentleman not only of very high standing in art matters, but of one personally engaged upon the English commission in Paris; and therefore carry a weight of truth with them which should engage the most serious consideration of every English art-producer. I will not trespass further upon your space, but in conclusion beg to thank "R. F. H." for affording me an opportunity to clear away an error respecting the *union* system and architectural sculpture.

JOHN RODDIS.

STRIKES *v.* TRADES UNIONS.

SIR,—I read with much interest the reports and letter, which appeared in the last three issues of the *Builder*, on the above important question. As most of the writers on it are either opponents or eulogists of unions, who press every point in their favour, and try to make them beautifully white, whilst the others state that everything connected with them is of the darkest hue; and as the *Builder* is an impartial medium of communication between employers and employed, I hope you will grant a small space for a workman's view of this at present national and important matter. I may state that I entirely dissent from some of the leading doctrines of the unionists, such as the limitation of apprentices, and I have up to the present held aloof from unionism, believing that a neutral force of workmen should exist sufficiently strong to curb the irrational acts of unionists and employers. It seems to me that anti-union writers are always trying to make the world believe that employers are the most honest and just people in existence. And taking their stand-point from that premise, they claim that the masters alone shall regulate and fix the remuneration of labour; and that the workmen, not understanding the question, shall take any price which the employer in his wisdom may think fit to offer. I differ entirely from the conclusions arrived at by these writers, and from a lengthened observation and a practical experience in various parts of England, I have found that the masters' love of honour and justice is not of that character which would warrant the workmen in submissively trusting to it.

The writers in the Quarterlies, "British Almanac and Companion," and other publications of that description, are aware that, as a rule, the working men but rarely see or read, their articles. It, then, must be evident that they write for a class altogether different from that most interested in the approval or disproval of the sentiments they promulgate; and they thus have a total immunity from the criticism of the working classes. For instance, Mr. Plummer states, "there is not that antagonism between masters and men on the Continent which exists in this country." And there is an entire immunity from strikes and their consequences to the capitalist; but, if I recollect aright, strikes do sometimes take place in these Elysiums of the capitalist. And Mr. Plummer ought to have known that the public journals of this country have given fearful accounts of strikes which have taken place during the year in Belgium and France. And even in Berlin there is now an agitation for various objects, one of which is to reduce the hours of labour. It is well known from the history of trades unions in this country that they have gone through many phases to arrive at their present state; and that an incipient combination, such as now exists on the Continent, is the prelude to a thorough organisation, which in due time will embrace the greater portion of working men in these countries. Having dealt with the last question first, I will proceed with that of antagonism and kindly feeling, and show the reason for the difference in this and other countries.

At a period not very far back in the history of our country, masters and men were more nearly related in social position. The master was not above being seen chatting with a group of his workmen. His business was to a large extent known to them, and his interest formed a part of their duties to him. It is related by our elders that the employer was once not above smoking a pipe or taking a social glass with his men. The ambition and love of affluence and position which characterise the present age had not that hold upon the mind which they have now attained.

But, now, a twopenny builder, or any other like employer, must stand upon his dignity, and in the estimation

of his class he would lower himself by now and then meeting his men in social reunion. If the employer now condescends to speak to a workman, it is something between a grunt and a growl, to know how long it is before the piece of work he is engaged upon will be done. And in the large firms everything is done through the foreman or manager. The master, to all intents and purposes, is a stranger to his workmen. He knows but little, and cares less, about them. As soon as they have done his bidding, or a slack time comes, they are turned away at an hour's notice and without a moment's consideration of their services; and the belief is general that they are less cared for by the employer than are his horses and machinery.

One thing is certain, that the employing class of this country are striving for position; that is, if they now occupy a semi-detached villa, and drive a brougham, they are discontented because they cannot remove to a mansion and set up a carriage and pair. I am not one of those who condemn that ambition when kept within proper and legitimate bounds; but I do say, that when the end alone is considered, and the means to fairly and honestly attain it thrown aside, it is not to be expected that those through whom they expect to attain it will have much respect or kindly feeling towards them; and there is but little doubt that it is the selfishness of this class, and the treatment which the workmen have received from them, that have been one of the principal causes of the formation and success of trades unions. I intended to touch upon several other points in this question; but I find I have already trespassed too far, and must leave piecework and the present dulness of trade in every department till another opportunity. Writers who take up this question, to have any influence with the working classes, must treat it in a broad and impartial manner, or the workmen will turn with contempt from their statements, and the breach which now exists between the two will be still further widened.

JACK PLANE.

DISFIGUREMENT OF THE TRAVELLERS' CLUB HOUSE, PALL MALL.

I SHALL feel obliged if you will allow me to call the attention of members of the Travellers' Club, many of whom claim the character of men of taste, to the recent disfigurement of their club-house. This has just been effected by the removal of the ornamental stone balustrades from the balconies of the garden front towards Carlton-terrace, and their replacement by common bulging iron railings, of a design which I can only describe as Baker-street vernacular.

The effect of this unfortunate change is that the iron balconies not only attract attention to their own incongruity, but most seriously and injuriously affect the architectural character of the whole building.

The stone balustrades were designed in conformity with the rest of the front, of which they formed an essential portion. By their removal the elevation is not only mutilated of an important member, but the iron-work, by allowing more of the principal windows to be seen from below than the architect intended, materially injures their proportion. Moreover, the balconies themselves, being designed to support a stone balustrade, appear altogether inconsistent now that they have only to carry a nondescript erection of light iron bars.

The only advantage that can have been obtained by this ill-advised alteration is the gain in a rarely-used balcony of a few inches of space, being the difference in thickness between the old stone balustrade and the new iron railing. The price paid for this doubtful gain is the destruction of the charms of symmetry, finish, and beauty of proportion, which have always caused the garden front of the Travellers' to be considered one of the best works of Sir Charles Barry.

On hearing a rumour of what was intended, I tried by communication with the secretary, before the iron railing was put up, to avert the threatened mischief. Having been unsuccessful, it only remains for me to appeal through you to the members of the club and the public. Fortunately, the remedy is simple: it will be very easy to remove the iron railing and refix the original balustrade. In order that no objections of expense may arise, I can only say that, if the club will allow this to be done, I shall be happy to make them a present of the cost of the restoration, rather than see their beautiful front permanently defaced.

EDWARD M. BARRY.

PIPES EXPOSED TO FROST.

SIR,—I noticed a letter suggesting the insertion of a tube of India-rubber in water-pipes to keep them from bursting, but I think by the constant pressure of the water the India-rubber would get too hard to expand. Now, it has occurred to me since reading the letter, that if in some positions the lead-pipe were covered with an India-rubber tubing, it would assist to keep the pipe warm, and at the same time supposing the pipe did burst, it would prevent the water from flooding the house.

J. R.

BELLS AND BELL RINGING.

THE music produced by the ringing of a good peal of bells, at proper times, and in moderation, is truly pleasing to the ear. And at this particular season many persons will be reminded of the words of Charles Lamb, who says, "Of all sound of all bells—(bells, the music nighest bordering upon heaven)—most solemn and touching is the peal which rings out the old year. I never hear it without a gathering up of my mind to a concentration of all the images that have been diffused over the past twelvemonth; all I have done or suffered, performed or neglected, in that regretted time."

Now, the following arrangement, which has been adopted for many years at some of our churches, will show how to,—

"Ring out the old year, and ring in the new,"

in an appropriate manner:—

On New Year's Eve a muffled peal is rung from 11.30 till 11.55, to mark the departure of the old year. At 12 o'clock its knell is sounded by twelve strokes on the tenor bell. After which, the muffles having been removed from the clappers of the bells, the new year is ushered in by a merry open peal.

THOMAS WALESBY.

ELEVATION OF TOWNS ABOVE THE LEVEL OF THE SEA.

PERMIT me through the medium of your columns to suggest that a chart, showing the heights of our chief towns above the sea-level, would be a desirable publication, not merely to satisfy curiosity, but valuable as a reference upon many occasions, especially in connection with sanitary questions.

Popular opinions upon this subject are often very erroneous, of which none is a more remarkable example than the belief, all but universal, that the city of Salisbury is built in a very low situation compared with other cities. Having ventured to question the ground for that belief, I have obtained an answer inducing me to advance an opinion directly contrary, namely, that the site of Salisbury is really higher than the sites of the majority of cities and larger towns in England.

I found this opinion upon the authority of the Ordnance Survey, wherein it is shown that the Close, itself slightly lower than the city, is 150 feet above the level of the sea.

The knowledge of actual levellings enables me to claim this elevation as being very much, even 110 ft. higher than London and Westminster, and the general metropolitan level; 50 ft. above Islington; and 70 ft. above Paddington. Without actual levellings, general observations justify me in pretty confidently stating that this height of 150 ft. exceeds that of all the twenty-six cathedral cities, with two or three exceptions; also, that the whole of Salisbury is higher than the whole or greater portion of all towns of more than 9,000 people, in the South of England, with, perhaps, two or three exceptions; and that it is higher than any, much higher than most, of the larger towns in the eastern counties.

Of course, in forming the chart, only actual levellings, or most accurate barometric observations, could be relied on; and as the surface in many towns varies much, I would suggest that the mean of several heights be given; or if one height only, that should be of the market-place, rather than of the churchyard, because churches are often built in the highest parts.

A. B. MIDDLETON.

THE SENTINEL AND THE CLOCK.

SIR,—Mr. WALESBY alludes to the anecdote of the sentinel at Windsor Castle, and the recasting of St. Paul's bell. I therefore venture to refer him to "Memorials of Westminster," 1849, p. 199, where he will find some additional particulars, which I gleaned from the parish-books, and I remember even now from a newspaper after a weary search.

MACKENZIE E. C. WALCOTT.

"STRAW PLAIT DISTRESS."

SIR,—Having made a humble effort on the above subject by the kind permission of the *Builder*, on the 9th Nov. ultimo, I was not surprised to see my statements confirmed. The *Morning Advertiser* says:—"The poor people of Leighton Buzzard, Luton, Newport Pagnall, Tring, and other towns and villages, especially the females, have already begun to experience much distress; and the applications to the local boards of guardians for relief have materially increased within the last fortnight, and are sure in a short time to be so numerous as to severely test the capacity of the several workhouses, and the existing funds of the different unions in the district." I have heard, in the interim, from very worthy neighbouring authority, that "many of the women are gone to Manchester, and other large towns, to learn the weaving business, in order to save themselves from starvation." Even that, however, does not seem to have remedied the distress above spoken of, and humbly appears to me even doubly regrettable, as the other might be quite sufficiently "stocked" already; and their own was as little encroaching on others as could well be imagined. How thankful they *must* prove to their countrywomen from the humblest "middle class" to the "court," if they would take up their cause, in unmerited decline. Oh, that *I* had "means to order 1,000 straw bonnets,"—if coarse ones, and to be "given away in charity," as a hint of relief and hope at *their* distressed "Christmas of 1867."

A CAMBRIDGE MAN,
Native of the Quarter.

ST. JAMES'S TOWER, TAUNTON.

THE vestry have had a meeting to receive and accept tenders, &c., for the taking down and rebuilding of the tower, in accordance with the order of vestry given on the 10th of December last. Three tenders were received: one from Mr. Davis, Langport, 3,566*l.*; Mr. Davis, Taunton, 3,510*l.*; and Mr. Woolfrey, Taunton, 2,396*l.* Mr. G. Webber proposed, and the Rev. W. T. Redfern seconded, that Mr. Woolfrey's tender be accepted. Upon this a lengthy discussion took place, on a proposition of Mr. Small's, that Mr. Spiller's former tender of 2,860*l.* be received. This was objected to by the churchwardens, on the ground that he had not tendered on the present occasion, consequently it would be unfair to those who had. Mr. Coker then proposed that the subject be deferred until after Easter, to enable the parish to put in churchwardens in whom they had confidence. The chairman objected, on the ground that the expense ordered by vestry must be paid during the current year; when Mr. Coker constituted himself the chairman, and put his resolution, which was carried in opposition to Mr. Redfern, who quoted an Act of Parliament to show that the proceeding was quite out of order. After a noisy and lengthy discussion upon the point, Mr. Pollard introduced the subject of his account for making original plans, &c., and wished to know why it had not been paid, of which he complained. Mr. G. Webber (churchwarden) explained the reason why they had not recommended its settlement, and produced and read various letters and certificates from practical men, showing that his drawings were incorrect. The question fell to the ground in consequence of no proposition being made that the account should be disbursed. Mr. Small then proposed as an amendment to Mr. Webber's motion that Mr. H. Davis's tender be accepted, which was seconded and lost, and the chairman declared the resolution that Mr. Woolfrey's tender be accepted carried. Upon a motion that a three-penny rate be made, extending over a period of twelve years, to defray expenses already incurred, and the rebuilding the tower, a stormy discussion ensued, but the motion was eventually declared carried. A proposition was then made, to the effect that the tower should be taken down and entirely rebuilt from the ground, at an extra expense of 1634*l.*, which was agreed to.

THE BUILDING LINE IN THE EUSTON-ROAD.

FOR several years past there has been a contest carried on between the parochial authorities of St. Pancras and Mr. Bauman and other builders as to the line of frontage and elevation of houses erected on the forecourts of the houses in the Euston-road, between Hampstead-road and Osnaburgh-street; and the matter, having at length been referred to the determination of the Metropolitan Board of Works, that Board has decided to adopt the plan of Mr. Vulliamy, superintending architect, showing an improved line of frontage, by which any buildings to be erected on the northern side, between the points indicated, are to be kept to an extreme general line of from 10 ft. to 11 ft. back from the outer edge of the curb to the foot pavement, and on the southern side of the road the foot pavement is to be in like manner kept to a uniform width of 11 ft. As in other cases where extended lines of frontage have been settled with a view to future operations, a formal application will still be required to be made to the Metropolitan Board of Works for each building, in order to secure a uniform arrangement and to obtain an opportunity for reconciling the interests of the various owners.

THREE MEN KILLED BY FOUL AIR IN A WELL.

THE local press throughout the country ought really to din into the ears of the ignorant everywhere the simple means whereby wells may be cleared of foul air, as well as the greatness of the danger of descending into any well till simple tests be applied in order to show whether the air be foul or not. Wherever a candle will not freely continue to burn, human life cannot continue to subsist. If a candle go out, therefore, either immediately or after a while, when lowered into a well, something ought to be done to get rid of the foul air before any one descends. The most effectual as well as simple way of clearing the well of foul air is to throw down the draught tubing of a garden or other hand-pump, lengthened, if need be, for the occasion, till its open end nearly touch the water without dipping into it. By the working of the pump the foul air can then be pumped out just as if it were water; and it will flow away as water would do; for foul air, or carbonic acid gas, is so heavy, as a gas, that although it is invisible, it may even be poured into a vessel, and out of that vessel into another, just as water can. The man who recklessly plunges into the foul air of a well, therefore, may be said to be going into a fluid over head and ears which will drown him, though he can neither feel nor see it. One of the innumerable cases of drowning by foul air which are ever and anon taking place, has just occurred in Fareley-street, Birmingham, where, as usual, one poor ignorant fellow followed another to his fate with the kind intention of saving life, till three of them were all doubly drowned in foul air and in water together. In this case, even the precaution of a rope tied round the body was not used except in one of the instances, and it is believed the one who was so tied removed the rope to put it round one of the dead bodies, but became a dead body himself before he could do it. The first man had actually descended while no one was at hand to help at all.

AMUSEMENTS.

Haymarket Theatre.—There are two excellent scenes in the new burlesque here, "A Per-version of the Brigand;" one a pass in the mountains with the sun tipping their tops and gradually descending,—the other an Italian ball-room with double flight of steps in the centre at the back leading to the upper floor. These do considerable credit to Mr. O'Connor the painter of them. The piece, wanting in plot (as most burlesques are now-a-days), is smartly written by Mr. Gilbert A'Beckett. Mr. Compton, Mr. Kendal, and Miss Ione Burke have the principal parts. A new drama, "A Wife well Won," will be played here on Monday.

St. George's Opera House, Langham Place.—The new comic opera, by Mr. A. Sullivan and Mr. Burnand, *The Contrabandista*, includes some very agreeable music, is lively in plot, and altogether amusing; a neat *corps de ballet*, and sufficient chorus, completing the *ensemble*. *Puss in Petticoats*, and Offenbach's *Ching-Chow-Hi*, fill up the evening very agreeably. Nevertheless,

and we now speak with only one desire, the success of the undertaking, if Mr. Reed would have it take the position it should, and we have every reason to believe it would take, he must obtain assistants who can act and sing. At present the company has too amateurish an aspect to command a great success. There is another hint we would give him. The draught from the Regent-street entrance must be prevented. At present, even in the stalls, it is intolerable. At many of our theatres this nuisance is unbearable, and keeps many persons away.

The Polytechnic Institution.—The new lecture which Professor Pepper has prepared for the holiday season, "Faraday's Discoveries and their Results," includes matter more erudite than is usually administered here—matter, too, of very great interest. There are few people who, when they have heard there was a fault in the submarine cable, and it was about so many miles from shore, have not asked how it was possible to determine this latter point. The description in this lecture of "Wheatstone Bridge," as it is called, answers the question. Some amusing optical deceptions in the moving of tables and raising of Tobin are also shown; but to set these forth as any answer to the so-called Spiritual Manifestations of the day is a great mistake. They do not touch the matter at all, and would simply give the "*Spiritualists*" an easy victory. Electricity is receiving considerable attention just now at the Polytechnic, and the directors contemplate setting up a machine that will give a shock capable of killing off a man.

CHURCH-BUILDING NEWS.

Selby.—The church of St. James, at Selby, has been consecrated by the Archbishop of York. The building is being finished by the executors of the late Mr. James Audus, in whose lifetime it had been commenced, and who had agreed to be at the sole expense connected with the work. The tower is still in process of construction, and some external ornamentation to be carried out. The building has been constructed from designs by Messrs. Newstead & Low, of York and London, and consists of a nave, with aisles, chancel, with organ-chamber on the south side and vestry on north, and tower with spire at the west end. The total length of the church is 122 ft., the width 50 ft., and the tower and spire will rise to a height of 165 ft. The lower part of the tower is for use as a baptistery. The style is of the Early Geometrical period. It is built upon a plinth of Sheffield blue stone, and the external walls are fenced with Bradford sets with Ancaster stone dressings. The aisles are divided from the nave by five bays, the arches of which rest on single polished red Isle of Mull granite columns, each shaft being one piece, and having carved capitals in Ancaster stone. A variety of stones is used in the building internally, as well as externally. The chancel arch is carried on clustered banded shafts of red Devonshire marble, with carved capitals and stone bases. An eastern and two rose windows light up the chancel. The east window is filled with stained glass, which has been executed by Messrs. Heaton, Butler, & Bayne, of London, and contains the following subjects in the five lights:—The Call of St. James, the Raising of Jairus's Daughter, the Transfiguration (centre light), the Agony in the Garden, and the Martyrdom of St. James. The east wall, on either side of the reredos, is ornamented with a moulded and cusped arcade, supported on Italian Bardilla and Spanish Nareta marble columns. A sedilia has been introduced. The roofs are open and of stained timber, and the beams rest on carved corbels. Maw's encaustic tiles, in many different patterns, have been used to pave the church. The reredos is constructed mainly of polished Derbyshire alabaster, enriched with carving. It is divided into three panels, by coupled and single polished green serpentine shafts, with moulded arches, and surmounted with a moulded and carved cornice, with a cresting inlaid with bosses of polished Derbyshire spar of various colours. The lectern takes the conventional eagle form, but has been modelled for the architects from studies made by them at the Zoological Gardens. The organ has been built by Messrs. W. Hill & Son, London. The sittings are entirely free.

Newington.—The Bishop of London has consecrated the new church of St. Matthew, in the New Kent-road, near Newington-butts. The edifice, which, exteriorly and interiorly, is of a light character, has been built within seven months, Mr. Henry Jarvis, a local architect, and Messrs. Myers, the contractors, having been engaged in its erection. Mr. Robert Stephen Faulconer, of Walworth, and Mr. Whitehead have given large sums, the former about 5,000*l.* and the latter 1,000*l.* towards the cost.

Norwich.—St. Andrew's Church has been undergoing some further restorations. The present work has been to scrape and clean the stone-work; to restore the mutilated columns, the bases of which require to be nearly rebuilt; to banish the old square pews, and to substitute open benches. The scrapings of the columns brought out the warm colour of the stone which had been hidden beneath coats of whitewashing, and the walls have been tinted with a corresponding colour. The side passages are so arranged as to show freely and in full prominence the bases of the columns, without interfering with the arrangement of the benches. The material of which the old pews consisted has been employed in the new benches, the ends of which, towards the centre aisle, consist of deeply-recessed panels, made of the old oak, surmounted with tracery. The architect was Mr. William Smith, of London; and the contractor, Mr. Burrell, of this city.

Bury St. Edmunds.—St. Mary's Church has had the pews replaced by open benches, and the organ enlarged and rebuilt, and placed in the north aisle of the chancel. During these and other alterations, the edifice has never been entirely closed.

West Bromwich.—The new school church, which has just been erected in the Wednesbury-road, in All Saints' district, West Bromwich, has been formally opened. The foundation-stone of St. Andrew's Church was laid in June last, by Mrs. T. Jesson. The building is in the Domestic Gothic style. Mr. Somers Clarke was the architect. At the east end are the altar and superaltar. The church is built to hold 400 people, and when not in use as a church will be apportioned off into schools.

Firle.—The parish church of West Firle has been re-opened after extensive restoration and repairs. A little longer delay, and the whole church would have fallen down. With the approbation of the landowner of the parish, as well as of the vestry, the services of an architect were obtained,—Mr. Gordon M. Hills; and under his direction the works were undertaken; Mr. Davey, aided by Messrs. Parsons, of Lewes, being the contractors; and Mr. H. Weller, of Firle, acted as clerk of the works. The west walls of the two aisles were rebuilt, the roofs of the two aisles replaced on walls raised to the original height, the main roof of the nave strengthened, and the plaster ceiling replaced with a wooden lining. The modern windows in the clearstory were taken out, and six windows of the ancient form inserted, and a window in the east wall of the nave, which has been blocked up, re-opened. The arcade on the south side of the nave was underpinned and placed on a sound foundation. The gallery, which blocked up three arches, was removed, accommodation for the school children and inmates of Firle union house, who used to occupy it, being found in the body of the church. Outside, new buttresses have been built to support the fabric. In addition to these repairs, which were undertaken solely at the expense of the landowner, Viscount Gage, aided by a rate; the vicar, assisted by his friends, undertook the renewal of that part of the building especially set apart for the due and orderly celebration of the services of the church. The chancel and sacrarium have been paved, and a reredos erected, of tiles furnished by Messrs. Maw, from designs by their agents Messrs. Tompson & Sons, of London.

Dilwyn (Herefordshire).—The parish church has been restored and re-opened. Mr. G. C. Haddon, of Hereford, was the architect employed, and Messrs. Lewis & Day, also of Hereford, were the contractors. The cost of the restorations is about 1,300*l.*, including the Powell Memorial east window, by Messrs. Heaton, Butler, & Bayne. The reredos is the work of Mr. Forsyth, of Worcester, and is in marble, Caen, and Painswick stone. The east window consists of three lights. The centre contains the "Crucifixion," with the sun and moon darkened over the cross, and St. John and the two Marys grouped around its foot. The north light has the "Nativity." On either side are the shepherds and the Magi, the whole surrounded by the star of Bethlehem. In the south light the "Ascension" is represented. The head of the window is filled with the sacramental emblems—wheat and grapes—and the paten and chalice.

Books Received.

Abyssinia and its People; or, Life in the Land of Prester John. Edited by JOHN CAMDEN HOTTEN, Fellow of the Ethnological Society, &c.; with a new Map and eight coloured Illustrations, by MM. VIGNAUD & BARRAT. London: Hotten, Piccadilly. 1868.

THE most useful knowledge we can have at this moment in regard to Abyssinia is not so much what the most recent traveller through the country has to say, but what all Abyssinian travellers have said of it, including the most recent; and this is precisely what Mr. Hotten gives in a considerable portion of his very interesting volume. Considering the stereotyped and almost unchanging habits and character of Eastern peoples, much of what old travellers have told us of this people holds good to the present day; and indeed not a little of what was said in former times, but doubted by some readers, more modern visitors to the country have only confirmed. A book giving us the pith of all that has been said of our semi-savage foe—if we can call the Abyssinian people our foe—is therefore the most acceptable gift that could be presented to the public on this subject in this gift season.

The volume is divided into five parts;—on the country as seen by early and recent travellers; Consul Plowden's excellent description of the people and their country; the story of the British captives; suggestions for an expedition, with routes; and a bibliography of all the known works relating to Abyssinia.

VARIORUM.

ADDRESS to the members of the Historic Society of Lancashire and Cheshire. By Joseph Mayer, F.S.A., &c. Liverpool: printed by Thomas Brakell, Cook-street. Any remarks by Mr. Joseph Mayer on archæological or antiquarian subjects merit attentive consideration, and they are sure to receive it. The first subject treated of in this paper is the kitchen-midden folk of pre-historic times. The era when this race of men existed appears to be to a certain extent identified by the remains of the capercuilze, a bird which feeds on pine buds. The pine era of Denmark preceded its oak era, and that its beech era. If there was a pine era in this island at the same time, here is a proximate fixture of the geological era when the kitchen-midden people flourished. The era was a very ancient one, perhaps ten thousand years since, or even much more, and when the climate was much colder than it now is, but by no means so ancient as the era of the glacial drift, in which traces of still more ancient man have been found. Many of the kitchen middens accordingly occur along the present coasts, but not all of them: some are miles inland. Mr. Mayer considers the question of migration; as to which all we shall say is that we have never seen any allusion made to the facilities afforded to extremely ancient migrations, at an era even subsequent to the glacial, but when the climate was colder, by the freezing of the ocean surface farther south than now. Thus, for example, there certainly was a time, after the glacial era had waned, when Britain and the Continent were united every winter by a frozen sea. The wandering Esquimaux, and the Lapps, are probably remnants of ancient races whose fields of migration have only been narrowed by the mildening of climates in the juxta-arctic region, which region, in and after the glacial era, had not retreated so far to the north as now. Thus, amongst the Esquimaux and the Lapps, we probably have the likest state of mankind to that of the aborigines of this island—the earliest Britons and Picts, but especially to the glacial drift races. An account of the Lapps and Esquimaux, written by the light of these views, and of the glacial drift, flint implement, and kitchen midden phenomena, might shed a reflex light of great interest on the probable state, habits, and customs of our extreme ancestors. Mr. Mayer next treats of the time of Hadrian's wall across the island, which he is of opinion was built to resist—not the comparatively few northern savages alone, but an alliance of these with the far more dangerous pirates of the North Sea. But irrespective of the fact that the plague of these rovers, as Mr. Mayer admits, was not heard of for nearly a century later, would not the alliance of the pirates with the savages have only

rendered the building of a wall across the island less probable, and of less avail than if it were intended to exclude the savages exclusively? "The lost letters of the English tongue" forms the last subject treated of by Mr. Mayer. It is rather a startling one, but perfectly correct as he shows. Thus there are thirteen distinct vowel sounds in the English language, and to denote these, we have only the five vowel letters of the Latin alphabet, which our ignorant forefathers were persuaded to adopt from the Romans. On this account we have in a manner lost eight of these vowels as recognised alphabetical characters. ——"Rain: How, When, Where, and Why it is Measured." By G. J. Symon, F.M.S. Stanford, Charing-cross. Of late years the subject of rain has increased in interest. For some years a fear seemed to prevail that the rainfall was permanently diminishing; but these fears were succeeded by a new series in which it has been on the increase. The solution of the question whether the rainfall in this country was increasing, decreasing, or stationary, was the primary object of the researches of Mr. Symon, a very competent investigator. He has collected nearly 12,000 records of rainfall, which he has arranged, tabulated, corrected, corresponded about, travelled and searched for, besides organizing a system throughout the British Isles for observations on its distribution, entailing a vast amount of labour and no little expense. To a small extent, as to expense, his labours have been recognized and aided by the British Association. The records collected extend from the year 1677 to 1867; and one of the chief results appears in a tabular and diagrammatic form, which shows that about the middle of last century, for a series of years there was far less rainfall than there has ever since been; and that the greatest amount of rainfall during all these years was in the middle of the present century. The diminution between 1820 and 1850 was by no means so great as that of nearly the whole of the previous century. The wettest year of the whole series was in 1852, and the falling off after 1854 has ceased. The general result, as Mr. Symon remarks, "appears to indicate great steadiness in the supply if any considerable number of years are taken together, the principal exception being in the middle of the eighteenth century, when the observations indicate a remarkable and prolonged drought." ——Cassell's "Illustrated Catalogue for 1868," folio size, contains illustrations from thirty-five works, the chief of them by Gustave Doré. It makes a book worth preservation.

Miscellanea.

Manchester Certified Industrial Schools.—The annual meeting of this institution has been held at Ardwick-green. The report stated that the committee had been placed in a position of difficulty from want of dormitory accommodation, and they had thereby been induced to appeal to the public for a sum of money to build additional dormitories and workshops. The appeal was liberally responded to. The spare ground at the back of the schools was examined, and plans for additional buildings to give the necessary accommodation prepared. The building had been commenced. It was thought desirable to purchase an additional piece of ground to enlarge the playground, and this, with the cost of heating apparatus and fittings, would involve an expenditure of 300*l.* or 400*l.*, which had yet to be raised. A donation of 300*l.* had been given by the Manchester Corporation towards the building fund.

Purification of the Thames.—The conservators of the Thames are able to report that they have given the requisite thirteen months' notice for the removal of all sewers above Staines which emptied themselves into the river, or into any tributary stream within three miles of the river; and at a later period in the current year they gave like notices with regard to drains below that town. They have also served notice upon the proprietors of paper-mills requiring the discontinuance of the flow of sewage or other offensive matter from their mills. For the purpose of further preserving from impurity the waters of the Thames above the point of the water supply, the conservators employ a steam-tug to pass up and down the river, with a view to the removal of all dead animals and other polluting substances, and all the lock-keepers have instructions to remove all such nuisances.

Fatal Fall of a Church.—An accident has occurred at St. Paul's, Astley Bridge, near Bolton, by which one man has been killed and two others severely injured. The edifice was being widened, and, for the purpose of carrying out the extension, the workmen had sprung some arches, and it was noticed that one of these was fast giving way. The breach became so great that one of the needles or uprights supporting the key-stone of the arch slipped from under, and a tremendous crash followed. The roof of the church and the greater part of the building fell in. Three of the men were caught by the falling walls, and several others narrowly escaped.

A Cork Gasometer.—The Cork Gas Consumers' Company have completed their new gasometer, which is said to be the largest in Ireland. It is a plate-iron cylinder, 154 ft. in diameter, by 25 ft. deep, and has involved many thousand cubic yards of excavation, and an amount of masonry and other work, which for the past nine months has kept about 120 tradesmen and labourers of the city at daily work. Mr. Anderson, the engineer of the company, furnished the plans for the work, and it was carried out under the personal direction of the manager, Mr. Still. The entire staff of the works, about 200 in number, dined in it the other day.

Great Fire at Newcastle.—The dreadful explosion of blasting powder has been followed by another misfortune in the loss of property worth from 40,000*l.* to 60,000*l.* by fire from an unknown cause. There is no evidence, however, that Feninism has had anything to do with either calamity. The buildings in which the fire occurred form a block of the most valuable and finest stone buildings in the town. Of recent years nearly the entire range of buildings along the Quayside, at Newcastle, has been rebuilt, the old rickety erections, chiefly of brick, being supplanted by massive ones of stone. The improvements extended to Queen-street, King-street, and Akenside-hill, all in the immediate rear of that part of the Quayside next to the Guildhall. The fire broke out in a ship store, and destroyed a large portion of the block of buildings in which it took place. Unfortunately, the water supply was deficient in force.

French Hospital.—A dinner was given on Saturday evening in aid of a London hospital open to all foreigners speaking the French language, when the chair was taken by M. Devaux. A French dispensary, established in 1861, has rendered gratuitous medical aid to more than 7,000 sick and indigent persons; and last year it was determined to found a hospital, in order to complete the work commenced in the dispensary, and to offer to those speaking the French tongue the succour which the Germans have for many years provided for persons of that nation. The French Government promised an annual grant, and the appeal to the French in London was so generously responded to that the committee felt justified in beginning operations at once, by hiring a commodious house at the corner of Lisle-street and Leicester-place, in the centre of the French quarter, where patients are attended by two French physicians. It appeared from the statement of M. Rimmel, the hon. secretary, that the hospital and dispensary are under the same roof.

The Proposed New Town-hall for Wolverhampton.—The approval of the resolution of the local public works committee, sanctioning the plans of Mr. Bates for a sessions-house, town-hall, magistrates' court, and public offices, and directing him to complete the working drawings, and deciding that the committee should advertise for tenders, have been formally voted in the town council. The estimate of Mr. Bates that his plans could be carried out for 17,000*l.*, was, it is said, guaranteed by Messrs. Warburton, builders and contractors, at Manchester, and was accompanied by tenders from tradesmen in their respective branches of the trade—the latter amounting in the aggregate to several hundreds of pounds less than the estimate of Messrs. Warmington; and since the plans had been amended, on the suggestions of various officers of the corporation, Mr. Bates had written, assuring the committee that they could be carried out for the amount stated. It had been stated that the council were going to spend 30,000*l.* on the buildings. A 1½*d.* rate will produce sufficient to pay off the outlay and interest in thirty years.

Substitution of Arbitration for Strikes.—A lecture has been delivered in St. James's Hall, by Mr. A. J. Mundella, president of the Nottingham Chamber of Commerce, and chairman of the Council of Conciliation, on the substitution of arbitration for strikes in cases where differences arise between employers and their workmen. The meeting for the delivery of the lecture was convened under the auspices of the Reform League, and the chair was occupied by Mr. Samuel Morley. Mr. Mundella, we believe, has risen from a humble position to be the managing partner of a firm employing from 3,000 to 5,000 workmen.

Educational Conference.—A conference of the friends of national education (supported by local rates under local administration), to discuss the principles and provisions of the Education Bill introduced into the House of Commons last session, will be held in the town-hall Manchester, on Wednesday and Thursday, the 15th and 16th of January next. The time has arrived for a settlement of the question on such a basis as shall as little as possible disturb the existing machinery, but yet shall give scope for extension and development where needed, and shall provide instruction for the whole of the children of the poorer classes of the population.

"The Seven Churches of Asia."—An exceedingly interesting series of photographs, showing the remains of the seven churches of Asia, of the Revelation of St. John (Smyrna Ephesus, Laodicea, Philadelphia, Sardis, Thyatira, Pergamos), and the adjacent sites of interest; Monument of Sesostris, Niobe of Mount Sypilus, Magnesia of the Meander, Aphrodisias, Hierapolis, are now on view in the rooms of the Arundel Society, 24, Old Bond-street. They are the first photographs of these places produced, and were made by A. Svoboda, artist of the R.A. of Venice. Amongst the most interesting are those of Laodicea, including views of the Great Theatre, the Stadium, with the pyramidal petrified aqueduct, by the effects of the waters of the Lycus; the incrusting waterfalls, Hierapolis; and the Plutonium. At the foot of this temple is the water exhaling the deadly vapour mentioned by Strabo. Apart from the great interest of the sites, the photographs are very charming specimens of the art.

TENDERS

For alterations and additions at No. 69, St. John's-street, Smithfield, for Mr. E. Turnbull. Mr. L. H. Isaacs, architect:—

Axford	£575 0 0
Walker	478 0 0
Devereux & Son	404 0 0
Prince	402 0 0

For the drainage of the town of Haverill, Suffolk. Mr. B. Fitch, engineer:—

Tinsley & Turner	£1,065 9 0
Harris	957 0 0
Moxon	950 0 0
Dewitt	930 0 0
Mason & Son	914 0 0
Faulkner & Cowley	849 0 0
Bloomfield	840 0 0
Garwood	795 0 0
Potter	780 0 0
Hall	759 0 0
Fell (accepted)	738 9 0

For rebuilding back premises of 24, St. Mary Axe. Mr. H. H. Collins, architect:—

Sanders	£454 0 0
Newman & Mann	448 0 0
Cohen	375 0 0
Sale	350 0 0

For two houses and shops at Harrow-on-the-Hill, for Mr. Wm. Winkley. Mr. W. H. Woodman, architect. Quantities supplied by Mr. T. T. Green:—

Avery	£2,285 0 0
Woodbridge	1,920 0 0
Upchurch & Hanks	1,912 0 0
Taylor	1,910 0 0
Lander	1,900 0 0
King & Sons	1,860 0 0
Baker	1,852 0 0
Gibson, Bros.	1,947 0 0
Shurmur	1,793 0 0
Salter	1,644 0 0

For finishing the roads at Plough Lane Estate, for Conservative Land Society. Mr. James Wylson, surveyor:—

Benthall	£1,380 0 0
Reddin	849 0 0
Hancock	782 9 6
Goodair	759 0 0
Hamerton	730 0 0
Rough	685 10 6
Hubbard	640 0 0
Hiscox & Williams	595 0 0
Bloomfield	540 0 0
Neal	525 0 0
Brewer & Steggles	457 0 0
Burgess	450 0 0
Pizzey	425 0 0
Porter (accepted)	420 0 0